

Radio Control **CAR ACTION**

THE WORLD'S LEADING R/C CAR MAGAZINE

SNEAK PEEK: Associated's
new race truck! p. 21

June 1995

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ON THE COVER: photo by Walter Sidas. This page: photo by Frank Masi

Off The Road Again...

ELECTRIC OFF-ROAD racing is pretty cool stuff, but for me, it lacks something. Bear with me while I explain: I always watched motocross races on ESPN whenever they were on, and I've been to a bunch all across the country. Basically, there are two types of big motocross events: nationals and supercross races. Nationals are always outdoors and consist of long, gruelling courses that test the riders' stamina to the max. Supercross races, on the other hand, are a lot flashier. They're always indoors in a big stadium such as the L.A. Coliseum, and the tracks are considerably shorter but include mondo huge jumps and other obstacles that often give the racers major air time; we're talkin' 20 to 25 feet off the ground, folks!

Now, to pursue my original train of thought: I think off-road racing R/C style is pretty intense, but to me, every off-road track (at least, the ones I've been to) is just like a national motocross track. Most are fairly long and feature somewhat small jumps. Only a few of the tracks had really scary jumps thrown into their layouts. I'd love to see an R/C racetrack fashioned after a supercross layout. Let's see some 5- to 6-foot-high monster jumps and a few killer transition jumps. What about a 5- to 6-foot-high tabletop section? Toss out those puny rhythm, whoops and mogul sections, and toss in some 4-foot-high double and triples. Now, that would be pretty intense.



In the past, I mentioned that John Huber and I have tested miscellaneous cars and trucks at a local BMX track; we've had a blast jumping these things 5 to 10 feet up. It's so crazy! If you jump a vehicle just right off the face of a tabletop, it sails through the air 1 foot above your head; you tap the brakes, bring the nose down and glide on down the gentle back slope without bouncing all over the place. It sounds pretty hairy, but trust me, it works!

If the transition jumps are made just right, you'll land as smoothly as if you'd been only a few inches off the ground instead of being roughly 5 feet into the ozone. In my mind, racing would be much more intense; you'd have to set up perfectly for a jump or, just as in motorcycle racing, you'd be slammin' the ground pretty hard when you messed up.

Who knows where something like this could go? Maybe, just like in motorcycle racing, we could have a ROAR National off-road champ and a ROAR Supercross off-road champ. There would be spin-offs for technology, too. Manufacturers would soon be building the ultimate machinery—stuff that would withstand the rigors of intense R/C supercross jumps.

Who knows? Maybe I'm an idiot and everyone else will think this is a totally lame idea. But, again, perhaps someone will give it a shot, and it will really take off. I'd like to know what you think of all this rambling.

Also, we're talking about publishing a "Build Your Own Off-Road Track" article in the near future. Send us your ideas, and maybe we'll incorporate them into the article.

John Howell

We want to hear from you! Write, fax, or e-mail us over the Internet: Car Action, Air Age Publishing, 251 Danbury Rd., Wilton, CT 06897; fax: (203) 762-9803; e-mail: Chris Chianelli—chris@airage.com; John Howell (Doog)—johnh@airage.com; John Huber—jhuber@airage.com; Frank Masi—frankm@airage.com.

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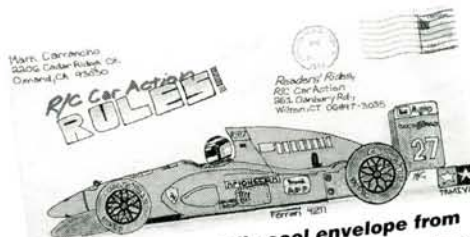
LETTERS

SLAM IT DOWN

In the February '95 issue, you had an article on the RC10 Team Car and how to convert it for on-road parking-lot racing ("Attack of the Killer Street Buggies"). Can that conversion be used for the RC10 Worlds Car? Thanks for your help.
ALAN HARVEY JR.
St. Helena, CA

Because the cars are very similar, Alan, I don't think you'd have a problem converting your car into a "Killer Street Buggy." All the basic principles that were applied to the Team Car should be easy to apply to your Worlds Car.

—Doogie



We received this really cool envelope from Mark Carrancho and we thought we'd share it with the readers. Thanks Mark.

GETTING INTO R/C

I tried a friend's 1/8-scale Traxxas gas buggy, and that car made me think twice about not getting into the hobby. I guess you can now call me a beginner. What would you recommend for me? I don't want to start out with a gas buggy.

JAMES DINKINS
Newport, KY

Well, James, if you're partial to Traxxas and off-road equipment,

then I suggest that you take a look at two of their new, entry-level, 1/10-scale, electric trucks: the Stampede monster truck and the Rustler stadium truck. They're relatively inexpensive, but if you want to shop around, I suggest that you look at the offerings of other companies, such as Tamiya, Team Losi, Team Associated, MRC, Kyosho and Schumacher. They all produce entry-level vehicles that would suit your needs. You're definitely heading in the right direction; start out with electric; after a while, you might want to give gas a shot, too.

—Doogie

PROJECT PAVEMENT MISSILE

I own a Tamiya Skyline. How can I make it faster? It's stock except for the Novak Rooster. Where can I get some chrome wheels and tires for my car? Any help would be appreciated.

Wa8vmr@aol.com

Well, the best advice I can give you is to contact someone at HPI—(714) 837-3250—or Tamiya America—(714) 362-2240. Both companies offer a ton of hop-up parts for your TA01 chassis; parts such as stickier tire compounds in slick and tread styles, graphite chassis, all types of wheels in numerous finishes, ball-bearing kits and so on. You could also pick up a hotter motor and batteries. You might also want to try Japan R/C Imports in Lafayette, CA—(510) 284-5778. They often have really trick, Japanese, aftermarket hop-up items for Tamiya's parking-lot-type cars. Good luck, and have fun.

—Doogie

GETTIN' BACK ON TRACK

I need information on starting a track, because the one I used to race at closed because not enough people used it. What do I use for the sides? Where's the best place to advertise? Where can I get track computer programming, and how much does it cost? How do you get sponsors? I already have the land, but I just don't know where to start. Any help would be greatly appreciated.

JOSHUA HEILBRUN
Scottsbluff, NE

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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Street Spec Racing News!



ALL THE LATEST AND HOTTEST IN STREET SPEC RACING!

THE NORTH EAST STREET SPEC-TACULAR SERIES is now in full swing and already has been deemed a success after the first two events. The 8 week, 8 race series for Street Spec Stock Cars and Trucks is being run at 4 indoor carpet oval tracks in the Eastern Pennsylvania area during March and April. Attendance has been very good with over thirty entries for the first two races. What is really amazing about this is 3 weeks previous to the start of the series none of the tracks had yet to start a weekly Street Spec racing program. As soon as they set up a race night for Street Spec, car sales have gone through the roof as have the race entries. Racers really seem to love the concept of low cost, high fun racing. Any hobby shop or track not running a Street Spec program is really missing out on a way to increase their business by bring new people into the hobby and offering something new for their seasoned racers.

The Trinity Team drivers, (Rick Icker, Frank Paulin, Jake Flurer, Ed Thuresson, Rick Haentijens, Frank Polomeda, Rob Cutman etc.) are at each race to help all the competitors dial in their cars to the track, answer questions, and to also run in their own exhibition race. The exhibition race is very popular with the racers as they can compare their lap totals to some of the best racers in the world. With all the equipment being equal its easy to see who the best driver is. The Trinity Team drivers also run handout motors which use stock brushes, are impounded each week, and are distributed randomly at the next race. To remove any ringers the winners motor is removed and given out to one of the crowd.

The participating tracks in this series now have active weekly Street Spec racing programs that boast more entries each week. All 4 tracks involved are using the Street Spec program to develop new racers and to offer an alternative to high cost racing for their veterans. If you are interested in Street Spec racing and are in their area contact any of these authorized Street Spec raceways.

Trains and Lanes	Easton, Pa.	Greg or Jeff	610-253-8850
Sinking Springs Raceway	Sinking Springs, Pa.	Randy	610-670-0760
Marshall's Hill Top Raceway	Honesdale, Pa.	Bill	717-784-1260
Road Runner Raceway	Bloomsburg, Pa.	John	717-729-7458

Top Ten Points after 2 races

1. Dale Conklin	180	6. Al Depoalo	146
2. Randy Gelsinger	156	7. Bill Marshall	145
3. Alan Behler	154	8. Mike Houghtaling	142
4. John Wohnus	151	9. Tom Owens	141
Mike Burns	151	10. Jeff MacMullen	140

TRC STREET SPEC RACER APPROVED By the time you read this TRC's new Street Spec car will be available and legal for Street Spec Racing. The "TRC SPEC 10" and the "TRC SPEC 10 TRUCK" meet all the specifications and is legal for competition as of April 15th. With TRC entering the Street Spec market it is a sign we are headed in the right direction and this will help Street Spec racing grow even faster.

8000	TRC Spec 10 Stock Car, no motor or battery	\$165.00
8005	TRC Spec 10 Stock Car, with motor and battery	\$199.99
8010	TRC Spec 10 Truck, no motor or battery	\$165.00
8015	TRC Spec 10 Truck, with motor and battery	\$165.00

NEW MINIMUM WEIGHT IN EFFECT...

Effective immediately we have reduced the minimum weight for Street Spec cars from 45 to 43 ounces. It was determined at our first series race that 45 ounces was way to high when Trains and Lanes ran out of lead weights half way through tech. The high minimum weight was imposed so there would be no penalty using a bumper, receiver pack large speed control etc. The concept is sound but we had to write the rules before any of the prototype cars were ever built, in order to have the rules in time. Well we underestimated what a complete car would weigh. And we did it by a lot. So now 43 ounces is now the minimum legal weight for Street Spec.

SUMMER SPEC SERIES TO START IN MAY

The Street Spec Summer series is set to kick off in mid May. Races will be outdoor asphalt oval and road course events for Street Spec Stock Cars and Trucks. The races will be held in the NJ, Eastern Pennsylvania area. The series will run through to September with a champion crowned for the both the Sportsman and Sponsored class points leaders. Participating raceways so far are:

Bob's American Raceway, Englishtown, NJ	908-446-3737
Zeppelin Hobbies, Riverdale, NJ	201-831-7717
Marshall's Hill Top Hobbies, Honesdale, PA	717-729-7458
R/C Pro Hobby 2, Bloomsburg, PA	717-387-0266
The Race Place, Farmingdale, NJ	908-938-5215
For more info call one of the above shops or Rick Icker at Trinity	908-862-1705

MAGIC DOES STREET SPEC

At this years Los Angeles Auto Show Trinity along with Funcar, (a program to get kids involved in learning through the use of R/C cars) had an interactive display where the general public was able to race R/C cars while raising funds for Funcar.

Over 500 people drove the donated Trinity Street Spec cars over a 2 day period without any mechanical failures. All that was done to the cars was the addition of the big TRC bumper and some detuning of the speed control, which increased the run time to around 20 minutes a charge. This show really did a lot to promote R/C car racing to the general public, and proved how good a rental R/C car a Street Spec car would be.



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LETTERS

Josh, we here at *Car Action* are building our own track, too. We haven't decided how we'll tackle the lap counting yet, but we have found some track-building materials. Someone told me that used fire hose makes great track barriers. I called our local fire station and told them what I was after. A couple of weeks later, they called back and said that they had some hose for me. A large company in the area had disbanded their private fire company and called the fire department to donate the fire hose. The hose's condition was questionable, so the fire department didn't want it. I called the company, set a time and went over to pick it up. We picked up about 20, 50-foot rolls of nice hose. Now we just have to lay it out to form a course; we can lay it down flat, or we can nail it to 2x4 blocks to stand it on edge. You'll find out which works better when we publish the article on building your own track.

—John Huber

INQUIRING MIND WANTS TO KNOW...

I have a few questions. First, I'm new in the R/C car field; if I bought an Associated RC10 Team car, would it be too advanced for me? Second, do you know of anywhere that sells just bodies for R/C cars; I'd like to have several different bodies for one car. Third, could you tell me a good company for F1 cars and bodies?

GEORGE ERIC ROLAND
Tallahassee, FL

Well, George, your question about the Team Associated cars is interesting. First, decide what you'll be doing with the car—racing or just bashing around in the backyard? If you plan to race, you've made a good choice, considering it's a full-blown racecar. That's not to say that it isn't a good backyard basher, too; even though it's a race-oriented car, you can still use it off the track. If you plan to run it only in your backyard, though, and you want to save a few dollars, you might want to check out Associated's RC10 Championship Edition car. Basically, it comes with gold shocks instead of the hard-anodized Team shocks; it has bush-

ings instead of bearings; and it comes with a good, variable-resistor, mechanical speed control. But if you plan to race, you might want to stick with the Team Car. It's more expensive, but it's a better racer right out of the box.

As for your body inquiry, check out companies such as A&L—(909) 735-5249; Andy's—(909) 923-6155; Bolink—(404) 963-0252; Dahm's—(707) 792-1316; DuraTrax—(217) 398-3630; Hot Bodies—(609) 893-7716; Parma/PSE (216) 237-8650; Pro-Line—(909) 849-9781; Protoform—(905) 646-7638; and S&K (515) 673-6930.

There are a lot more options available to F1 racers now than ever before. More and more manufacturers are starting to get involved. Because you're relatively new to the hobby, I recommend that you look at either a Kyosho kit or one by Tamiya. They're both more suitable for a beginner than one of the more "high-end" F1 cars. If you really get into F1 parking-lot racing, you can always hop up your car with some really trick parts from Koze (Koze produces really hot aluminum pieces for off-and on-road, and parking-lot racers—[510] 284-5778), or call HPI ([714] 837-3250), or you can graduate to a full-blown F1 racer from HPI or Corally (imported by DuMor [609] 829-1338). Good luck; I hope I helped.

—Doogie

DYING TO DYE!

Before I say anything else, I would like to say what a great magazine you have. I especially love the new design by Betty Nero. I have a question for you. I live in Bermuda and I don't have access to R/C parts. I'd like to know where I can get dye to dye some of my plastic parts. Once again, great mag!

CHRISTOPHER ALVES
Hamilton, Bermuda

You can dye the nylon parts of your cars with any fabric dye sold in stores. Look for brand name "RIT®"; it comes in a variety of colors. Make sure that the stuff you want to dye is made of nylon and not just white plastic. Nylon can take the boiling dye, but regular plastic will melt.

—John Huber



RACING NEWCOMER

David Bethke of Phoenix, AZ, discovered R/C racing about nine months ago. He quickly invested in this Losi LX-T, which he equipped with a Novak 410 Sport, an Extreme Stock motor, an off-road diff kit and Futaba radio gear. Next, he bought this Double-X, which he set up with a Novak 410 MXC, a Green Machine II, a Dynamite micro receiver and Futaba radio gear.



3-WHEELIN' GREAT AMERICAN HERO

Raul Trevino of Cheyenne, WY, sends us this photo of his insane, home-built 3-wheeler. The front forks are made of chrome and flat aluminum, and the foot pads and battery holder are of flat aluminum. The gas tank is made out of a 2x4-inch block of wood that has been hand-carved, sanded and painted candy-apple red. The 3-wheeler rides on a combination of Big Brute and MRP High Roller tires and rims. The Speedworks 427 motor is powered by a Futaba MC112B speed control with reverse, which receives its signal from a Hitec Challenger 3PXD. The 6- or 7-cell battery pack sits under the full-size, slightly modified G.I. Joe, who pilots this radical ride as it tears up the track.



R/C MANIAC

This photo comes from Cory Masich of Golden, CO. He has been into R/C for the past 12 years and races at his local tracks. Cory has 49 R/C vehicles: the electric ones have Tekin, Novak, or Futaba ESCs, and the gas have Picco, Royal, O.S., or Nitro Hawk stock engines; all of them are controlled by Futaba radios. Cory adds that maintaining all of these vehicles is a lot of work for one person.

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fourth annual "Reader's Ride of the Year Contest" in the fall of 1995. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



BIONIC BRUISER

Jack Wright of Winston-Salem, NC, bought this Tamiya Bruiser for 30 bucks, and he knew that he could rebuild it; he had the technology. The drive train has been extensively modified to include an Astro pulling motor and a Bolink gear drive. These were needed to turn the set of JPS Clod wheels that had been modified to fit the Bruiser. Jack also added working headlights, taillights, side marker lights, roll-bar lights, dash lights and a 7-bar neon-light set that's powered by 10 AA batteries under the body. Cool ride, man!

R/C EMT

It took about two years, but Bryan Schultz of Wyoming, MI, finally finished his own ambulance. He started with an RC12LW chassis, inverted the suspension and added a "smash plate" to the rear end to protect the motor. He fashioned the body out of thin sheet aluminum that he put together



with rivets, and he wired all the lights, including fog lights and forward and rear light bars. Bryan said he then installed a really annoying siren to keep the track clear.



ENTER THE DRAGON

This photo of Ray Chu's Tamiya King Cab was taken on the roof of his building in New York City. The cab is equipped with Futaba Magnum Junior radio gear, an MC210CB ESC and full ball bearings. Owing to a parent-enforced budget cut, the rest is stock, but Ray plans to upgrade it in the near future.



CAN AN R/C DO THE DOG-PADDLE?

Here's the story about the day the R/C gods were looking out for Michael Mahig of N. Valley Stream, NY: against the advice of his twin brother, Michael drove his Tamiya Blackfoot—equipped with a Traxxas XL-2 ESC, a Traxxas receiver and servo and a stock motor—across a seemingly frozen pond. It sank—big time! Michael fished it out, dried it off and was pleasantly surprised to find that his Blackfoot survived. Michael and his brother own a total of nine cars, including a Grasshopper 2, an RC10T, an RC10 and this huh...huh...cool Tamiya Lunchbox.

HOW ABOUT THE BACKSTROKE?

These two R/C swimming companions come from Zander Lens and Steven Passmore of Englewood, CO. The Losi Double-XT is hopped up with a Novak 410-HP ESC, a Trinity Gem Series Diamond motor and Dean's Ultra Plugs (to name just a few mods). The Clodbuster is modified with full Dynamite ball bearings, Trinity long Clodbuster shocks, an ESP lift kit and much more. Gee, guys, maybe you should get together with Michael and test out some R/C boats?



In search of fun
and glory, cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE scoop



TAMIYA National Championship Event



On Saturday and Sunday, June 24 and 25, drivers from all over the country will compete at Tamiya's R/C Championship Series U.S. Nationals '95 at the company's racing facility in Aliso Viejo, CA, to determine who will represent America at the Tamiya R/C World Competition in Japan later this year. Yes, that's right; the top winners in the 4WD, FWD and Formula 1 categories will be awarded all-expense-paid trips to Japan to participate in the event—not a bad deal, is it? Tamiya's parking-lot facility is one of the most spectacular—if not the most spectacular—tracks in the country. It features an AMB/autoscore automated lap-counting system, a raised, canopied drivers' platform and a large pit area with AC power. The 154x46-foot track has asphalt islands that are easy on the cars. If you're interested in registering for the race, call (800) TAMIYA-A, and ask for extension 846.

Associated's new RC10T2

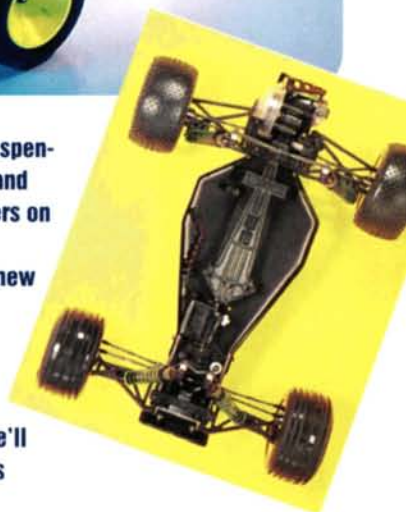
There's a new kid on the block in the ever-ragin' 1/10-scale truck wars. Check out Team

Associated's newest entry in this category—the RC10T2. From the ground up, the truck is almost all completely new. The only parts borrowed from the RC10T are the hard-anodized Team shocks, Associated's torque-control clutch and the neon-yellow one-piece wheels. The new items include: an all-new chassis (made of 2024 aircraft-grade, hard-anodized aluminum, it features raised sides for more ground clearance in hard cornering); a new 2.6:1 Stealth tranny (allows you to run hotter motors and features a lay-down design); and new front



and rear suspension arms and shock towers on both ends.

Pro-Line XTR tires and new battery-mounting and steering bellcrank systems add to its impressive list of features. Stay tuned; we'll put the truck through its paces shortly!



Pro-Line's Rollin' Rubber

There's a lot of stuff happenin' at Pro-Line. They have an all-new, softer tire compound—XTR-M2—that features a more adhesive compound than their original soft-compound tire, the

XTR. In the hands of top drivers—most recently

Mark Pavidis, who won the 2WD Modified class at the 1995 Florida Winterchamps—the new tire compound has proven itself a winner all over the U.S. in national events.

Also new in the XTR-M2 compound are these hot, new F1 Hawk tires. They feature the same directional street-tread design as you'll find on Pro-Line's popular on-road Road Hawk tires. The F1 Hawks ride

on Pro-Line's new, direct-fit F1 replica racing wheels. So if you're looking to get new tires on your road rig or off-road racer, check out some of Pro-Line's new rolling rubber. Call Pro-Line if you'd like to know more: (909) 849-9781; fax (909) 849-2968.



INSIDE scoop

Losi's Silver Bullet

Team Losi is proud to announce the release of their new softer, stickier Silver-compound tires. After months of being rigorously tested by Team Losi's racing team, the tires are now available to racers everywhere. They're made of the same compound as the tires Team driver Brian Kinwald used to TQ and win in both the 2WD and 4WD classes at the ROAR Modified Nationals in Tampa, FL. According to Team Losi, even though the new tires are softer, they can be used for longer and show less wear than most other compounds. Losi's Silver-compound tires are available to fit both trucks and buggies, and they all come with foam inserts. For

more info, contact Team Losi at (909) 465-9400, or fax them at (909) 590-1496.

Flash!—Team Losi Silver-compound tires fill 25 out of 30 A-Main positions at the Florida Winterchamps in Tampa, FL!



Protoform Nastruck



Protoform's Dale Epp is pleased to announce the introduction of his new 1995 Chevy Supertruck body—the first in the company's new line of oval truck bodies. If you've been in a cave for the last couple of months, you might not yet know that supertruck racing is the hottest thing to hit the high-speed oval since Dale Earnhardt. Protoform's version of the truck meets NORRCA's height rule, and it's designed to fit all the popular superspeedway chassis. It comes in both regular and lightweight versions, and it has a large, add-on spoiler. As you can see, it's a real looker, too. How does it perform? Well, at its debut at NORRCA's "Gear" race in Bakersfield, CA, Sean Young used this new body to TQ the event and break the track record three times, and he went on to win the A-Main by a lap and a half. Keep on truckin'! For more info, contact Protoform Inc. at (909) 849-9781, or fax them at (909) 849-2968.

Pro-Racer Silicone Shock Oil

"Whether you race at the North Pole or the new track in Hell, our oil stays true to weight."

- Oil weight remains stable under increasing track heat, so suspension set-up won't change
- 1/2 weights from 10-70
- Allows precise tuning of your suspension to match changing track conditions



\$2.99
All Weights



Trinity Products, Inc.

1901 E. Linden Ave, #8 Linden, NJ 07036
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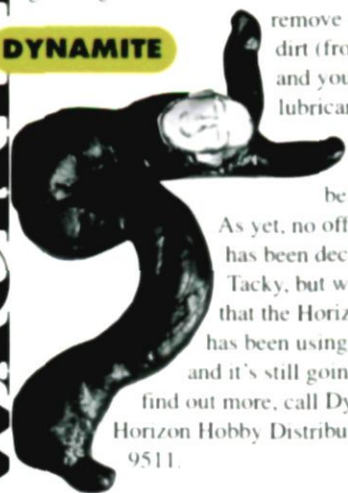
Novak's Chargin' Rhino

Novak's newest charger—the Rhino—is tough, smart, easy to use and very affordable (it's listed at \$112.50). The Rhino features Novak's Digital Peak-Detection Circuitry, which senses the ultimate charge. All you have to do is turn it on and hit the "Charge" button. There are no timers, computer keypads, or complicated instructions to follow. The Rhino even allows you to interrupt and resume the charge cycle at any time. Inside the charger, you'll find a cooling fan and an air filter (which you can clean) that helps keep dust and dirt off the electronics. The Rhino can handle four to eight cells, and if you spin the amp knob to "Minimum," the Rhino will charge receiver or transmitter packs. Solid-state RVP and thermal-overload protection make this one tough unit. For info, call Novak: (714) 833-8873; fax (714) 833-1631.



I'm sure that, at this point, you're asking yourself, "What the...?" Well, this interesting-looking substance, which has taken the form of our editor, John "Sluggie" Howell, is a new product from Dynamite. It goes by the name of Wacky Tacky, and it's a unique, putty-like substance that allows you to clean hard-to-reach components without disassembling anything. You just press the Wacky Tacky against the dirt or crud and then pull it away, bringing the filth with it. Stretch and fold the Wacky Tacky, and the dirt disappears! With use, the Wacky Tacky gets larger, but it continues to work. Use it to

DYNAMITE



remove fuel residue, dirt (from shocks, gears and your chassis), lubricants, tire dust (from your body), or even belly-button lint.

As yet, no official life span has been declared for Wacky Tacky, but we've been told that the Horizon racing team has been using it for a year, and it's still going strong. To

find out more, call Dynamite at Horizon Hobby Distributors: (217) 355-9511.

ZIP PAK™

Professional Power for Pennies...



It has been said the human hand is better than a computer at assembling battery packs. Don't believe it! Computers don't have bad days. They don't break up with their girlfriends and they don't have headaches. People do. That's why they don't always do the same job the same way twice. They're only human.

That's why Trinity uses an exclusive, computer-controlled, automated assembly system for their Zip Pak. Reliability and consistency are programmed in and never vary.

This automation is combined with the very finest materials. The cells are Sanyo KR1300SC (1300mAh) and there has never been a world champion that didn't run Sanyos. They've never lost! All tabs are pure nickel and as short as possible to minimize resistance. Each is double welded, and all wires are pure copper with silicon insulation. The entire assembly is pressed into a precision fitted tube which protects it from the rough and tumble world of racing.

As the bare, assembled pack nears completion, it is connected to an instrumented quality control panel which measures all facets of the pack's performance. Only then is the Zip Pak label applied.

The result is the lowest cost, highest quality sport pack available.

Buy several as back-up spares. Never be short of power.



TRINITY

Trinity Products Inc

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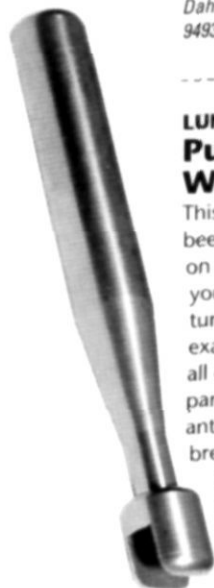
DAHM'S RACING BODIES F1 Fighter™ Body

This new F1 racing body features: super-low aerodynamic styling; a bi-level front wing; an adjustable, bi-level, rear wing; a motor-cooling scoop; a driver figure; fine detailing; and Dahm's decals.

It's perfect for high-speed roadcourses and parking-lot racing. It's designed to increase speed and improve handling on most 1/10-scale, on-road pan cars, such as the RC10L and RC10LS5.

Part no.—D012; price—\$20.98.

Dahm's Racing Bodies, P.O. Box 360, Cotati, CA 94931-0360; (707) 792-1316; fax (707) 792-0137.

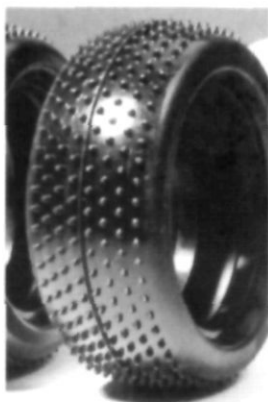


LUNSFORD RACING Punisher Pro Wrench

This aluminum wrench has been machined and turned on a lathe, and it allows you to grip the center of a turnbuckle to easily make exact adjustments. As with all of Lunsford's titanium parts, this wrench is guaranteed not to bend or break.

Part no.—W-102; price—\$5.

Lunsford Racing, 619 First Ave. E., Albany, OR 97321; (503) 928-0587; fax (503) 967-5917.



TEAM LOSI 4WD Front Tires

These new tires are based on Team Losi's most popular rear tire—the IFMAR pin—and have already taken drivers at the Reedy Race of Champions to the winners' circle. These 2.2-inch tires can be used with all 4WD cars and are available in both Gold compound and the exclusive, new, soft, Silver compound. Both types come with high-quality foam liners.

Part nos. and prices—A-7281G (Gold); A-7281S (Silver); \$11 each.

Team Losi Inc., 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9728; fax (909) 590-1496.

SCHUMACHER Active Caster System

This new active caster kit improves your Losi car's handling, making it more responsive in the turns. Included in this system are new front shock towers and arms. It's also available for the RC10.

Part no.—U1618B; price—\$34.95.

Schumacher USA, 6302 Benjamin Rd., Ste. 404, Tampa, FL 33634; (813) 889-9691; fax (813) 889-9593.



TEAM LOSI Bearing Spacer and Axle Washer Set

This set includes bearing spacers that will fit between your truck's front-wheel bearings and between its rear-axle bearings. The set also includes a new "stepped" rear-axle spacer/washer, which allows the spacer to run only against the inside bearing race. Now, both the front and rear wheel nuts can be tightened without binding the ball bearings. The rear spacers can be used on both the Double-X and the Double-XT while the front spacers can be used only on the Double-XT. Each set includes one full set of front and rear spacers.

Part no.—A-9941; price—\$9.95.

Team Losi Inc., 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9728; fax (909) 590-1496.



DAVIS MODEL PRODUCTS Clip-It Fuel Clips

These miniature, automotive-style, stainless-steel, self-tightening hose clamps are just the thing for getting a grip on fuel tubes. They prevent fuel and pressure lines from slipping or vibrating off those out-of-reach fittings, and this, in turn, will prevent the loss of pressure that can lead to engine failure. Installation is easy: simply squeeze the clip's arms together, slip the clip over the fuel tube and release.

Price—\$3.95/pack of 8 (plus S&H).

Davis Model Products, P.O. Box 141, Milford, CT 06460; (203) 877-1670.



DURATRAX O'Donnell Racing Fuel

This fuel features an improved formula and a new low price. The 20-percent-nitro mixture is blended specially for R/C cars and trucks and is ideal for top-level racing. The O'Donnell special-oil blend keeps engines running cooler and with greater consistency, and that provides smooth acceleration and great idling characteristics.

Part no.—DTXP0500;
price—\$29.99/gallon.

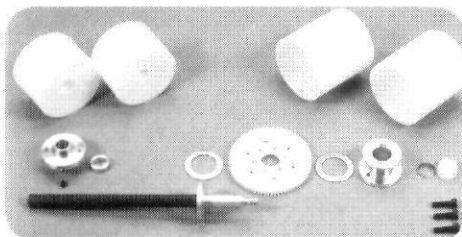
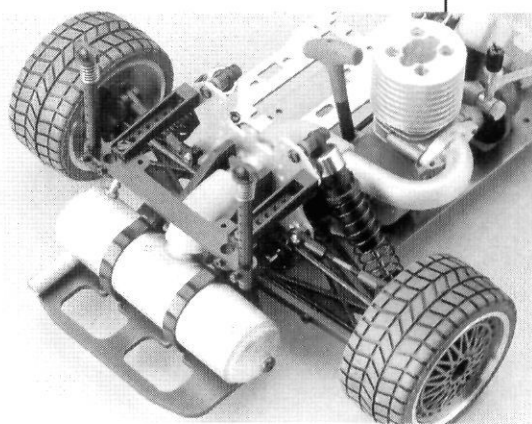
DuraTrax/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-3630; fax (217) 398-0008.

KYOSHO Scale-Muffler Set

Boost the performance of your on-road, 1/10-scale, nitro-powered, 4WD Kyosho Mercedes-Benz and BMW M3 GTR with this specially designed muffler set. Complete with all the necessary hardware, this high-performance set accents the touring cars with a scale-like rear exhaust pipe.

Part no.—KYOC5442; price—\$88.99.

Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-3630; fax (217) 398-0008.



TEAM ASSOCIATED 1/12-Scale Stealth II Diff and Wheels

This diff axle kit reduces the overall weight of the rear axle and reduces the rotating mass of the diff and axle assembly. Small diff rings and a smaller ball pattern improve the diff action and give you quicker acceleration. The new spur gears are made for the Stealth I and II axles, and the wheel hubs have been redesigned for greater strength, but they still have a lower rotating mass. Complementing the new axle design are new front and rear wheels. They have stronger outer rims that don't flex (unlike older wheels). They also have unflanged ball bearings that reduce the car's front-end weight.

Part nos. and prices—4455 (1/12-scale Stealth II diff kit), \$25;
3609 (Stealth II rear wheels), \$3.50/pair; 3649 (dished front wheels), \$3.50/pair.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626-1403; (714) 850-9342; fax (714) 850-1744.

MOTOR MAN Car Stand

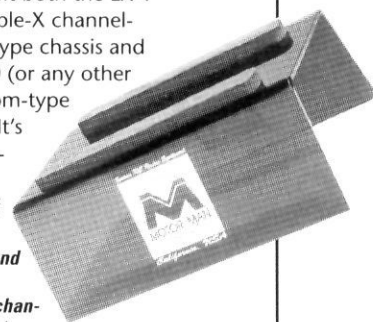
Tired of chasing your car around your work table? This new acrylic stand, which features anti-slip neoprene rests, will put an end to that problem and will make wrenching on your car easier than ever. It's available in two styles, so it will fit both the LX-T and Double-X channel-bottom-type chassis and the RC10 (or any other flat-bottom-type chassis). It's also available in a variety of colors.

Part nos. and price—

MM1695 (channel-bottom);

MM1696 (flat-bottom); \$14.

Motor Man, 8950 Osage Ave., Sacramento, CA 95828; (916) 381-7491.



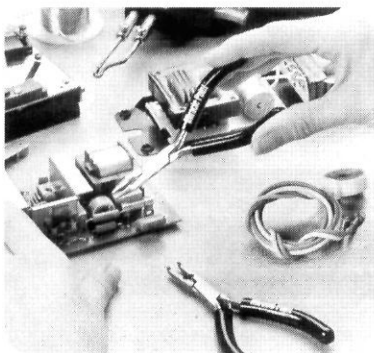
MIRACLE POINT Pliers

These needle-nose and bent-nose pliers are only 4 1/2 inches long and have an extremely strong grip. They're sculptured out of 400-series stainless steel and feature built-in cutters. Both are ideal for working

on minute areas and for reaching unusual angles, and that makes them suitable for many craft and model applications.

Price—\$15 each or \$25/pair.

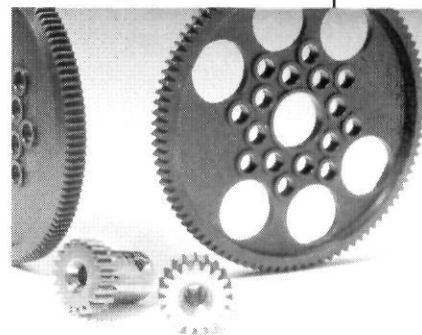
Miracle Point, P.O. Box 71, Crystal Lake, IL 60039; (800) 682-4256.



DU-MOR Gears

Du-Mor offers a complete line of gears for your R/C car. Spur gears are available in 48 and 64 pitch and in several styles, from standard to Pro-Thin. All spurs are made of a strong, durable, composite, carbon-fiber/molybdenum-nylon material, and they feature snap-lock diff-ball holes, so they'll stay put. Du-Mor's strong, steel pinion gears are coated for smooth, quiet operation. They're available in 48 and 64 pitch and in extended versions for Corally cars, such as the SP12. Call for a complete list of pinions and spurs and their prices.

Du-Mor R/C Inc., 1002 Union Landing Rd., Cinnaminson, NJ 08077; (609) 829-1338.



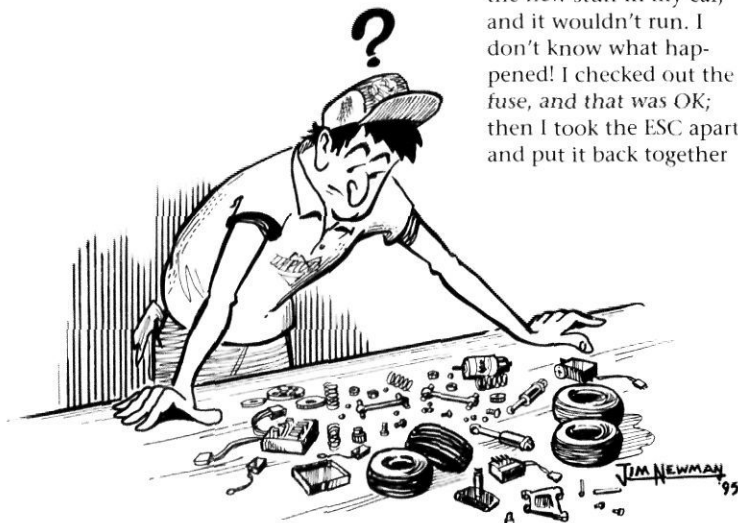


TRUBLE SHOOTING

by John Huber

Rip It To Shreds

I have a Novak ESC. The other day, I bought new gears and motor brushes for my Ultima. I put all of the new stuff in my car, and it wouldn't run. I don't know what happened! I checked out the fuse, and that was OK; then I took the ESC apart and put it back together



again. Still nothing. Can you help me?

JOHN MONTGOMERY
Milton, FL

If the problem started after you installed the new gears and motor brushes, then I doubt that it has anything to do with the ESC. I can almost guarantee that it's the brushes. First, make sure that the lights on the ESC are functioning. If they aren't responding, then you have an ESC or battery-connection problem. If they're working, then check your motor out. If you had to replace the brushes, chances are the commutator also needs some attention. Slide one of the brushes

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you.

Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

out of the motor, and look at the comm. If it's black and dirty, get a comm stick, and give it a few turns. This should do the trick if the motor is still in decent shape. Also, make sure that the brushes are free in the hoods by pulling on the brush wire and letting the brushes snap back against the comm.

Faster 4-Runner

I was going through my collection of *Car Action* magazines when I came across an advertisement for a Kyosho Pathfinder—a gas car that's sold only in Canada. I'm tired of my electric 4-Runner and would like to upgrade it to gas. I see that it already has holes for installing the engine. With all the new, hot engines on the market, I'm just itching to make the 4-Runner into a bullet that Superman couldn't catch. I also recall that the gas car has (are you ready for this?) reverse. You're not the first person I ran to for help with this problem. I've already called Great Planes, and they were no help. I would like you to tell me what spare parts I need to convert the car, including the gears that will make this car go in reverse. I would also like to say that you guys have the "phattest" magazine with just the

right recipe to keep people reading.
BENNY HUANG
Jackson Heights, NY

Yeah, Benny, I still have the 4-Runner. I also saw the gas version and toyed with making the switch to gas. I found out that Kyosho has decided not to import the gas version. It's very expensive, and it has a .10 engine and a transmission that has a variable ratio. This means that the gas version doesn't have one fixed gear ratio, or even two, but a wide range of ratios.

I heard that the tranny had some problems with lubrication and could overheat. Kyosho knows that here in the States, we would plop a

.12 in the car for more speed, which would fry the tranny, so they bagged the idea. There might, however, be a way to convert your car. When you remove the electric motors, the gear to the tranny is visible through the motor mounts. With a little cutting and drilling, I think you could get a .12 engine (or two) to fit. You'll need a pull-start engine. I think the clutch system from a

DuraTrax truck would work nicely, but you'll have to do some calculating to find the right gear ratio. I recommend adding an aluminum plate to the inside of the chassis; it strengthens the chassis and helps to keep the engine cool. An engine-driven fan will also help with the cooling. Good luck, and let me know if you get it to work.





Seize the Day

I have a Porsche 911 with an O.S. .10 engine. I have trouble with the engine; it seems to seize when I try to start it up the second time. It un-seizes after 30 minutes; then it seems fine. Please help.

BILLY WULFKEN
Warrensburg, NY

The seizing you're experiencing is caused by too much fuel in your engine, otherwise known as

flooding. When fuel is in the crankcase, it's drawn up into the combustion chamber and can't be compressed by the rising piston as a fuel/air mixture can. To remedy this, simply remove the glow plug, invert the car, and pull the starter cord a few times until all the fuel pours out. If it keeps on happening, the mixture might be too rich. Try leaning in the needle a little, and see if that helps.

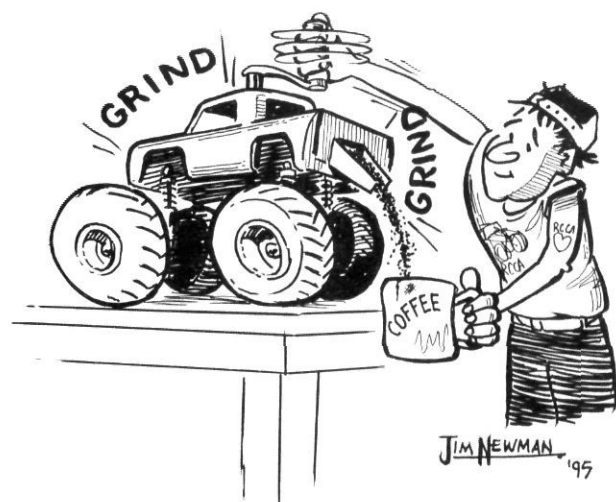


Carpet Fresh

I've been R/C racing for a year. I have a Cox .049 GTP Nissan, and I'm using the Sidewinder radio and the electronics that came with it. I was wondering if I could convert it for carpet racing and if I could use a .10 engine with the motor mount that came with it. Thank you for your help.

ADAM GRUBE
Nazareth, PA

Unless you have some place outdoors to run on carpet, I wouldn't bother. The Cox .049 could be run on carpet right now, but the exhaust fumes will be a problem inside. As for the .10 engine—no dice! The mounts are completely different, and the engine is way too big to fit in the car. I'd stick with the .049



Grind-O-Rama

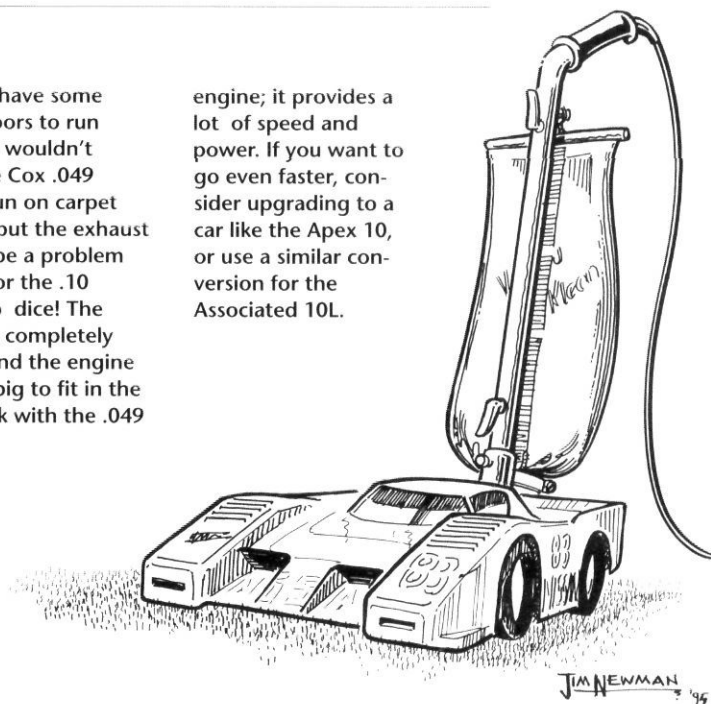
My Blackfoot truck keeps on grinding from the transmission but, if I remove the dogbones, it sounds OK. I can't find any broken or stripped teeth. I have no instructions, and there are no hobby shops close by, so I'd be grateful for your help.

CHRIS VON ROCH
Omak, WA

You're headed in the right direction. The grinding sound is coming from the dogbones. On the Blackfoot, the dogbone has hexes on the ends that key into the tranny and the axles.

The hexes wear out quickly, and they don't work as well as dogbones that have a ball with a crosspin-shaped end. I remember when I had a Blackfoot, I would go through a set of dogbones in one day (I took seven sets of replacements on my vacation).

You can lower the rear suspension to make the bones more level so they last longer, or you can replace the entire drive system with a kit made by Thorp that includes a ball diff, a counter gear and crosspin-type dogbones.



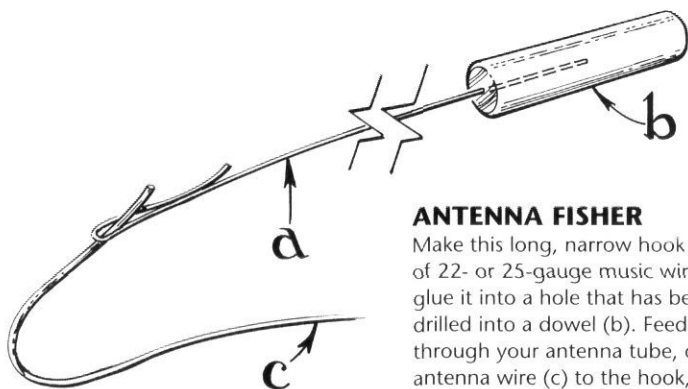
engine; it provides a lot of speed and power. If you want to go even faster, consider upgrading to a car like the Apex 10, or use a similar conversion for the Associated 10L.



PIT TIPS

by Jim Newman

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o **Radio Control Car Action**, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



ANTENNA FISHER

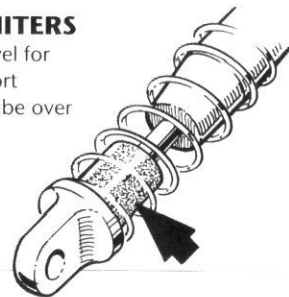
Make this long, narrow hook (a) out of 22- or 25-gauge music wire, and glue it into a hole that has been drilled into a dowel (b). Feed the hook through your antenna tube, clip your antenna wire (c) to the hook, and pull it back through the tube.

Jeff Hadlock, Garland, TX

CUSHIONED SUSPENSION LIMITERS

To limit suspension travel for on-road use, slide a short length of rubber fuel tube over the shock shaft.

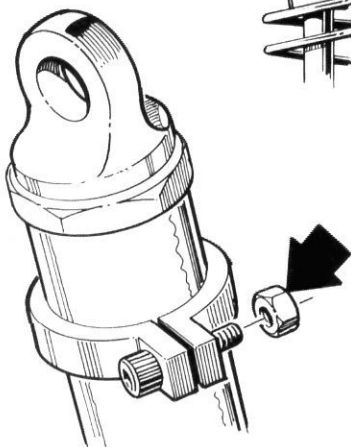
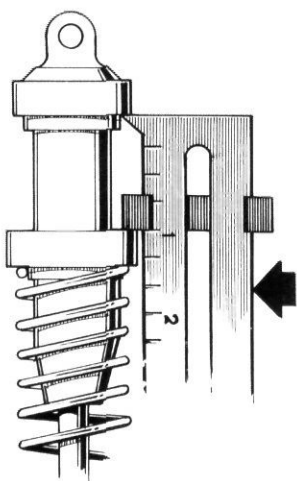
*Luis Duarte,
Lisbon, Portugal*



SHOCK-SETTING GAUGE

Use this 90-cent sewing gauge to quickly and accurately set your shock collars to the same preload.

*Erik Matsumoto,
Apple Valley, CA*



STRIPPED SPRING CLAMPS

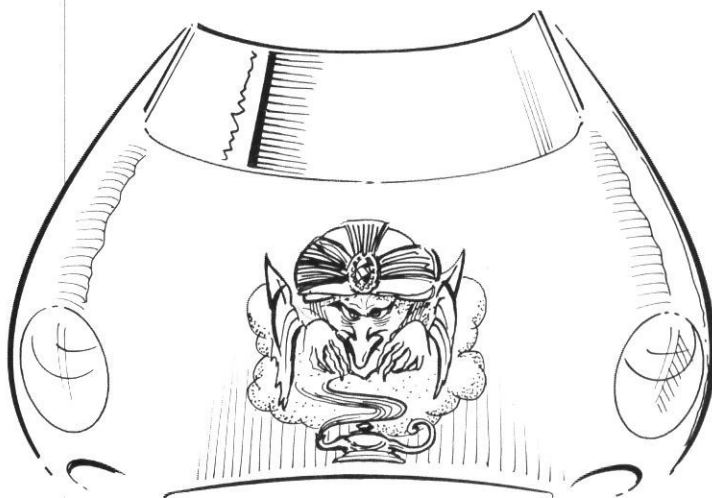
If the threads in your clamp become stripped, just use a longer screw, and put a nut on the end.

James Ward, Merced, CA

FEARSOME DECALS

Before painting your car, apply inexpensive, temporary tattoos (according to package instructions) to the inside of the shell. Many striking—even fearsome—designs are available.

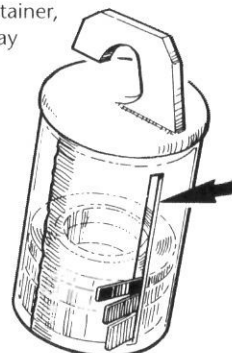
Quan Rusk, Civic, Australian Capital Territory



TRIM-TAPE DISPENSER

Slit the side of a Pactra trim tape dispenser with an X-Acto knife, then feed the tape through the slit. By being kept in the container, the tape edges will stay clean.

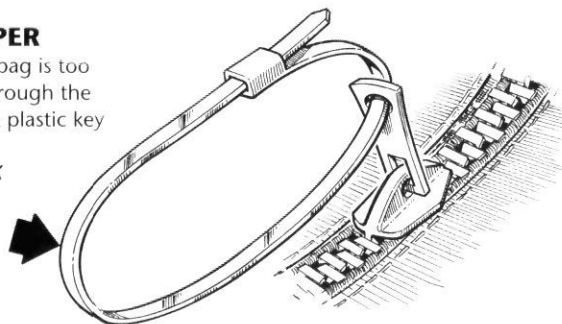
*Angelo Taormina,
Trenton, NJ*



SPEEDY ZIPPER GRIPPER

If the zipper tag on your race bag is too small, thread a small zip tie through the hole, and leave a large loop. A plastic key fob also works well.

Cory Lehmann, Pflugerville, TX



DAHM'S

RACING BODIES



NEW! D016 TORNADO II™
 Racing Truck Body for Narrow Super
 Speedway Cars. Super Aerodynamics! Flat
 Bed, 2" Spoiler, & Grill Decal! Also fits
 Tamiya Toyota Prerunner, Chevy S-10,
 Clodbuster, USA-1, Hemi Vette & Coupe!
NORCCA APPROVED!



NEW! D017 TORNADO II™ High
 Performance Racing Truck Body for Standard
 Width Cars like the RC10L. Features Flat
 Bed, 2" Rear Spoiler & Truck Grill Decal!



NEW! D020 M3 EXTREME™
 Super Handling, Highly Detailed, Touring
 Sedan Body with Wing for Tamiya Sedans.



NEW!! No. D025 SPICE WSC
 Fits Most 10th Scale Cars Like the RC10L.
 Fine Detailing, & Superior Handling.

ROAR & NORCCA APPROVED!



NEW! D012 F-1 FIGHTER™
 Super Low Formula One Racing Body with
 Fighter Wing. Fits RC10L & RC10LSS.

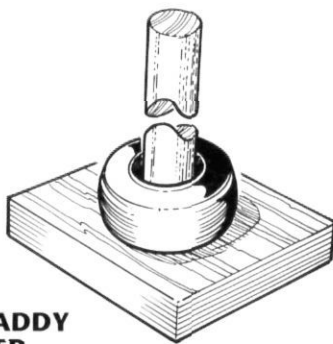


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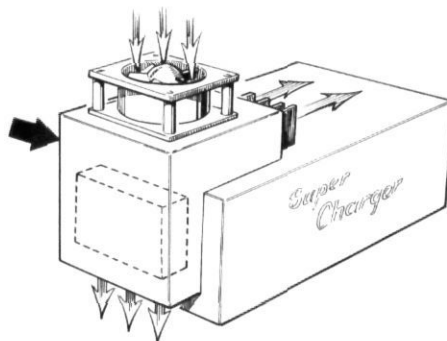
PIT TIPS



TIRE-CADDY STACKER

To make this handy tire caddy, screw a
 6-inch-long (150mm) dowel into a thick,
 4x4-inch (100x100mm) piece of wood.

Richard Arsenian, Sydney, NSW, Australia



COOL TURBOCHARGER

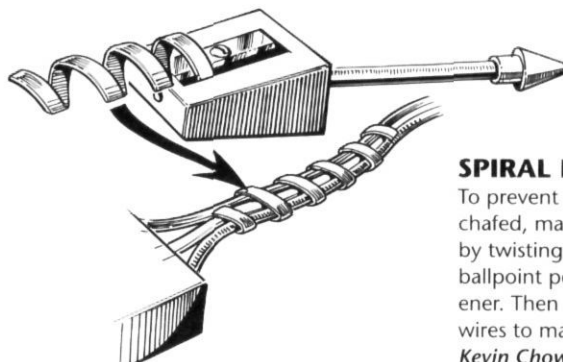
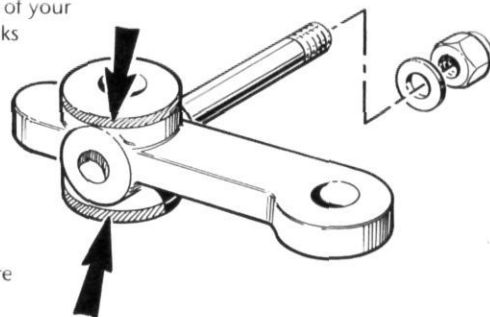
Place this inexpensive Radio Shack com-
 puter fan on top of the cardboard ductwork
 (arrowed) that's put together with tape or
 hot glue and held on top of the charger
 with zip-ties or rubber bands. The air is
 guided efficiently over the heat-sink fins
 and the resistor pack (dashed lines).

Jeff Knight, Collinsville, MS

RC10L QC WHEELS

Eliminate the need for E-clips on the axles of your
 RC10L by changing to RC10 steering blocks
 (no. 6221), RC10 axles (no. 6220) and
 RC10 wheel bearings. Now you can
 swiftly change your tires because your
 wheels will be retained by a nut instead
 of those E-clips (which frequently
 spring off into the grass). File or sand the
 shaded part of your new steering block
 until it's the same height as your old one.
 Be sure to keep the surfaces flat and square
 with the kingpin.

Ryan Knowlton, Bellingham, WA



SPIRAL BINDING

To prevent your wires from becoming
 chafed, make this spiral plastic binding
 by twisting an empty ink tube from a
 ballpoint pen through a pencil sharpener.
 Then twist the spiral around the
 wires to make a neat cable loom.

Kevin Chow, Bassania, S. Africa



by Doug Mertes

Tune Your T-Bar

MANY PAN cars and Formula 1 chassis use a flex-plate, or T-bar, as the basis of their rear suspension. This T-bar is a simple, flexible, tunable design that has been around for years with many variations. The basic flex-plate is usually attached to the main chassis at two pivot points, using standoffs or

twist resistance of the plate and the damping action of side-mounted shock absorbers or plate-shaped pucks, which are pressed against the top and bottom of the upper pod plate by adjustable springs.

Though possible pod-damping adjustments are many and varied (shock-fluid viscosity, spring

This T-bar has an offset, long-sided triangle cut out of its center. This removal of mass increases front-to-rear flexibility, but it reduces twist resistance on the side with the vertical leg. This may prove useful on flat oval tracks, and it provides the same effect as a 45-degree T-bar (where the weave of the fiberglass is oriented on a 45-degree bias). The difference is that you don't have to settle for only 45 degrees! The plate flexes along the triangle's longest side. Experiment to discover the ideal angle, traction and flex resistance for your track.

If you're willing to experiment a little, you'll have the means to completely change the way your rear pod reacts to the track. Since this knowledge will be yours and yours alone, nobody will be able to duplicate your work—unless you tell them your secret!

rocker balls captured by nylon keepers. Front-to-rear movement is controlled by a combination of the flexibility of the fiberglass or graphite plate material and the damping action of a shock absorber or spring-loaded shaft. Side-to-side movement is controlled by a combination of the

rate, silicone puck fluid, etc.), few tuning choices are available for the T-bar itself. Many manufacturers offer the racer a choice of two or three flex-plate thicknesses. Thinner plates yield more traction on slippery tracks, while thicker plates are used on high-traction surfaces. Notice,

however, that plate thickness affects not only front-to-rear traction movement, but also side-to-side flexibility.

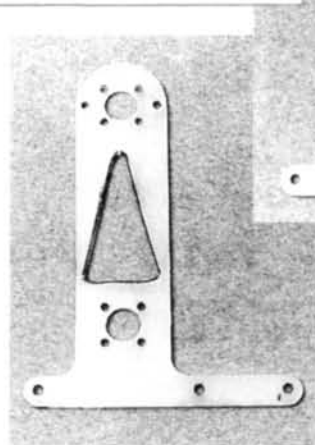
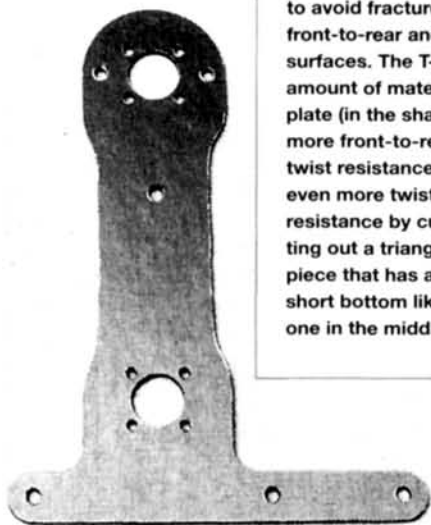
What if you want more traction, but less side flexibility? Up until now, you were pretty much out of luck. All that's about to change as you learn how to simply and easily tune your T-bar to suit different track conditions. You'll have to think about this topic, however,

pod reacts to the track. Since this knowledge will be yours and yours alone, nobody will be able to duplicate your work—unless you tell them your secret!

Start by looking at the flex-plate arrangement on your car. I used the familiar Associated* 10L for this article, but all T-bars work pretty much the same way, so what I do here should also apply to your car. Notice how the plate flexes mostly between the two pivot points? Move the rear pod forward and backward, and you'll see how the T-bar actually bends in an area that's slightly to the rear of midway between the pivots. That's because the rear pod is closer to the rear pivot ball and has more leverage at that rearward point.

The flexibility of the plate itself is controlled by the mass of the cross section where it bends. This mass equals the thickness multiplied by the width of the piece. Thin plates bend more easily than thick ones because they have less

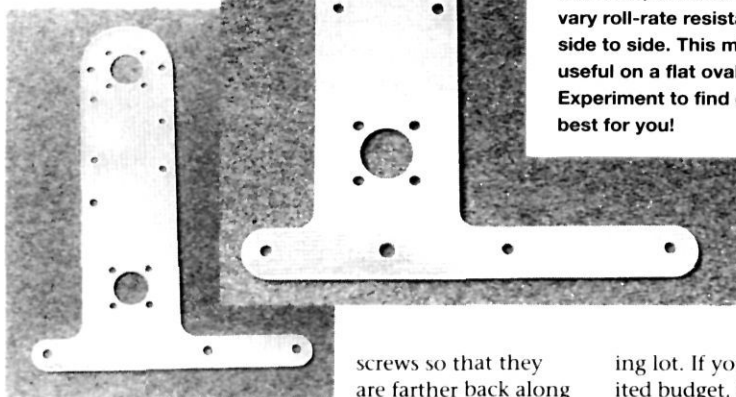
The T-bar on the left has been narrowed by $\frac{1}{8}$ inch on each side. The cuts have been smoothed into curves to avoid fracture on impact. This bar increases both front-to-rear and side-to-side flexibility on low-traction surfaces. The T-bar on the right has had the same amount of material removed from the center of the plate (in the shape of a rectangle). This bar allows more front-to-rear flexibility, but it retains more of the twist resistance provided by the original part. Keep even more twist resistance by cutting out a triangular piece that has a short bottom like the one in the middle.



because we don't all face the same conditions or like our cars to handle in the same way. If you're willing to experiment a little, you'll have the means to completely change the way your rear

mass. You can fine-tune this action by altering the thickness (which is really hard to do), or the width of the bar portion. Achieve this alteration by narrowing the sides of the bar between the pivots, or by cutting some material out of the middle of the bar. Try not to leave any sharp corners on your cuts, because that will cause the plate to fracture along a path from that corner. Instead, make all of your cuts nice and round, and carefully sand the corners with a small stone on a rotary grinding tool.

You can also alter the cut's effect by changing the shape of the piece that you remove. More mass removed from the width results in more front-to-rear flexing, while mass removed from the length reduces "twist resistance."



Cutting out a long, wide rectangle increases flexing in both directions, while an oval or triangle increases flexibility in one direction more than another.

Tweak preload (sometimes called "wedge") is usually set through a pair of screws mounted on the T-bar alongside the front

pivot ball. The screw that's turned in farthest preloads the opposite side of the rear pod and adds downforce diagonally to the opposite front wheel. If you want more weight on the left-front and right-rear tires, screw in the left tweak screw, and unscrew the right one equally. Unfortunately, if you also want to increase twist resistance, you're pretty much stuck with increasing damping action, and that adversely affects front-to-rear flexibility and reduces traction. What a complicated mess!

If, however, you change the locations of the tweak

The T-bar (near left) has tweak-screw holes drilled every 1/4 inch along both sides. Use the holes that are closer to the rear of the pod to provide progressively increasing roll resistance; this will keep you flat and fast on a banked oval course! The bar (far left) has holes drilled offset from each other along the sides; the car's owner can vary roll-rate resistance from side to side. This might be useful on a flat oval track. Experiment to find out what's best for you!

screws so that they are farther back along the bar, you increase twist resistance but retain full adjustability. For example, on a slippery banked oval, you may want to increase traction or reduce rear pod twisting to reduce roll rate and increase efficiency. Moving the tweak screws back a 1/4 inch at a time increases twist resistance slightly without decreasing rear traction.

Because the distance between the rear pivot ball and the tweak screws is shorter, there will be more roll resistance, but since you haven't changed the distance between the pivot points, the bar's front-to-rear flexibility will remain the same.

I'd like to encourage you to buy a couple of spare T-bars and experiment with different cuts and shapes. Keep a record of the results that each has on your car's performance. You may find that you like to run one kind of T-bar on the oval and a different kind on the park-

ing lot. If you're on a limited budget, find a friend who has the same brand of car as you, and swap altered bars back and forth. Over time, I think you'll find yourself getting a bit faster and you'll understand a little more about how your chassis works. Isn't that what this hobby is all about?

**Addresses are listed alphabetically in the Index of Manufacturers on page 168. ■*

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O.S. Max .21 RX-R(P)

IT HAD BEEN three years since I had tested an 1/8-scale engine—the Nova-Rossi Rex 3.5cc—so I was ready to check out another one.

With their horse-power/cc ratio of 0.6:1, these engines are on the

- where an engine/pipe setup gets “on” and “off” the pipe (on either side of best torque position) in the rpm scale (thereby establishing an optimum selection of gear-shift points);
- the best use of mid-range throttle openings under acceleration.

The rolling road dyno allows you to assess all aspects of an engine’s performance—not just how much power it puts out. Being able to do this

might allow you to get more out of a particular setup than you’d guess from its power figures. In the world of competition, top drivers are sometimes falsely accused of running “specially prepared engines,” but all they’re doing is maximizing their engines’ all-around performance.

Does the rolling road dyno leave anything for static dyno readings to demonstrate? Sure! Focusing on crankshaft hp alone (at constant rpm) gives a different picture of an engine’s capabilities and allows you to assess the effects of using different pipe lengths.

Let’s look at the top O.S. car engine—the Max .21 RX-R(P)—which was introduced three years ago.

MECHANICAL DETAILS

The O.S. 21 has a rugged, well-designed, one-piece crankcase (a considerable improvement on their earlier 3.5cc car engines). O.S. are renowned for the quality of their mass-produced engine parts,

which ensure reliable performance.

The crankshaft induction bore is aerodynamically formed at the crankweb face, and the crankpin is lubricated with oil that’s fed by centrifugal force through a hole that’s machined from the inner induction-bore surface out to the crankpin (see Figure 1). There aren’t any lubrication holes in the conrod big end, and this is probably a good thing (better pressure build-up results in that bearing compared with the “pressure-relief” effect of having holes drilled around the rod’s bottom end).

O.S. are committed to their Nicasil plating process for the cylinder liner; and the latest liners are also honed internally after being ground to size. CNC machining is now so accurate that grinding is usually enough, but O.S. go that extra step and hones, too.

Exhaust timing at 168 degrees and transfers to the combustion chamber at 118 degrees give a nice long blowdown period of 25 degrees for good tuned-pipe response.

Weighing 2.2 ounces (a fifth of the engine’s total weight) the large eye-catching heat-sink cylinder head is fitted at 0.015-inch squish clearance; this gives a 9:1

ABOUT OUR GUEST AUTHOR

Mike Billinton is known worldwide for his rigorous evaluations of model engine performance—especially engines designed for R/C planes. He lives and works at the Santa Pod dragstrip site in Northants, England, and he regularly reviews engines for R/C Car Action’s sibling publication, *Model Airplane News*. We welcome him to *Car Action*.

effective compression ratio, which seems to be a little on the low side to give best performance on 25-percent-nitro fuel. It’s certainly safe, though, and it should mean reliable track performance (probably the O.S. engineers’ reason for it). If you remove the 0.008-inch-thick gasket, you’ll raise the effective ratio only to near 9.5:1—not enough to make a real difference.

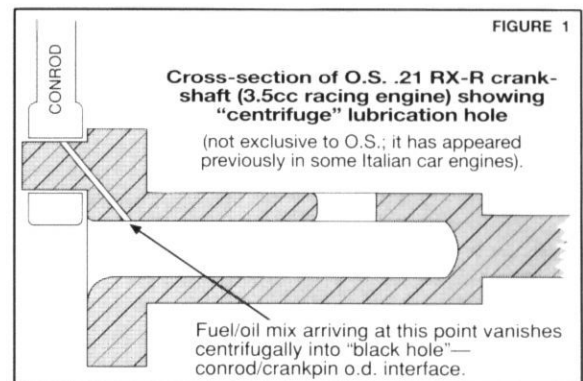
The new O.S. 20A slide carburetor has a plated barrel and is well-insulated from engine heat by a washer and a sleeve. This should mean more power, steadier running and improvements in both acceleration and deceleration.

PERFORMANCE

As is usual, the piston/liner fit was slightly tight at top dead center (TDC), and break-in took longer than average—around 40 minutes. Low-resistance rotation was always very good.

Test 1

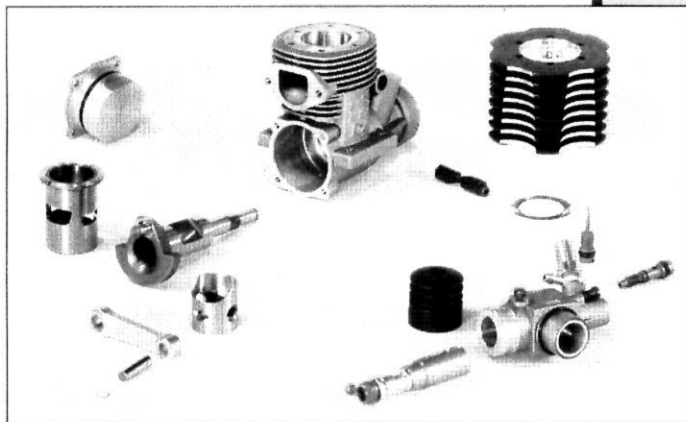
Open exhaust; 5-percent-nitro fuel with 6 percent castor oil and 12 percent ML70 synthetic oil; Rossi RA cold (R8 equivalent) glow plug.



top rung of what’s commercially available anywhere. But this level of performance is what’s actually available at the crankshaft; usable horsepower where the tires meet the track is another matter. Drive-train losses and rpm variations eat into the manufacturer’s predicted “gross hp” figures.

First, I must point out that my test equipment only allows me to measure hp at constant rpm—a situation that you won’t find in the real world of R/C cars. I can’t assess acceleration in relation to any given torque curve. To overcome this, others developed a “rolling road dynamometer,” which allows you to find:

FIGURE 1



The percentages of oil used are in line with O.S.'s recommendations. —Torque and hp were well up to today's levels. —Available torque ranged across a very wide rpm band.

Tests 2 through 6

O.S. tuned pipe (no. T2010; EFRA no. 38 JM0005); fuel, oil and plug as in Test 1.

Header length was varied; results are shown on graph 1.

• Header at its uncut length of 95mm

—Torque was at its highest, but hp was quite repressed—1.46hp (compared with O.S.'s claim of 2.2hp at 32,000rpm).

• Header shortened

—As the header was shortened, the rpm at which max torque and hp could be expected rose, but there's a limit to this. At header lengths of 50mm and 30mm, max torque was so reduced (even though at ever higher rpm) that hp also began to drop. —This too-short header also gave an ever-increasing "hole" in the torque curve that would really hurt acceleration out of corners.

It's worth commenting on the O.S. leaflet that came with the engine. Concerning the pipe/header setup, it reads, "A longer header improves torque at high rpm, while a shorter

header improves torque at low/middle rpm." Surely, this is wrong! As my results show, the effect is quite the opposite; and all previous pipe tests confirm this. (Is this why this fine engine has taken so long to achieve top track results? Perhaps drivers have been desperately seeking high torque at lowish rpm by continually shortening the header, and then becoming even more bogged down coming out of the corners!)

Anyway, what's clear (from these results, at least) is that header lengths of between 70mm and 95mm are probably OK for most applications; and 65mm gives max hp, but this isn't of much practical use unless rpm are not allowed to drop below 29,000 or thereabouts. As can be seen then, in the EFRA setup, medium/longish lengths result in the best crankshaft hp at around 1.5 to 1.6; and this seems to agree with reported rolling road dyno results of power at the wheel/track interface being in the 1.4hp area.

I saw no signs of the manufacturer's claimed 2.2hp! In fact, I'm sure this figure can only be achieved when three conditions apply:

- It will be manufacturer's crankshaft hp.
- It demands the use of short headers that racers are unlikely to use on the track (and, consequently,

SPECIFICATIONS

WEIGHTS AND DIMENSIONS

Capacity	0.21097ci (3.457cc)
Bore	0.6535 in. (16.6mm)
Stroke	0.629 in. (915.9766mm)
Stroke/bore ratio	0.963:1
Timing periods	Exhaust —168° (angled up 12°) Transfer —118° (angled up 12°) Boost —114° (angled up 58°) Front induction —opens 41° ABDC —closes 62° ATDC —total period 201° —blowdown 25°
Combustion volume	0.27cc
Compression ratios	13.8:1 (geometric) 9:1 (effective)
Exhaust-port height	0.236 in. (6mm)
Cylinder-head squish	0.015 in. (0.38mm)
Cylinder-head squish angle	1.5°
Squish-band width	0.127 in. (3.25mm)
Carburetor bore	0.354 in. (9mm)
Crankshaft diameter	0.5115 in. (13mm)
Crankshaft bore	0.391 in. (9.95mm) narrowing to 0.375 in. (9.53mm)
Crankpin diameter	0.1956 in. (4.97mm)
Crankshaft nose thread	0.248 in x 28 TPI* (1/4 NF)
Wristpin diameter	0.1575 in. (4.01mm)
Connecting-rod centers	1.18 in. (30mm)
Engine height	3.63 in. (92.2mm)
Width (across lugs)	1.77 in. (45.07mm)
Length (backplate to front bearing)	2.48 in. (63mm)
Width between bearers	1.21 in. (30.8mm)
Mounting-hole dimensions	1.455x0.827x0.13 in. (37x21x 3.3mm)
Exhaust-manifold bolt spacing	0.944 in. (24mm)
Frontal area	6.12 sq. in. (bare)
Weight	Bare—10.35 oz. (293g) With tuned pipe and header— 13.75 oz. (390g)
Crankshaft weight	1.45 oz. (41g)
Piston weight	0.10 oz. (3g)

*Threads per inch

PERFORMANCE

Maximum B.hp	2.005 @ 31,589rpm (O.S. pipe @ 65mm/50% nitro) 1.67 @ 33,194rpm (O.S. pipe @ 65mm/25% nitro) 1.255 @ 28,311rpm (open exhaust/ 5% nitro)
Maximum torque	64 oz.-in. @ 28,632rpm (O.S. pipe @ 65mm/ 50% nitro) 61 oz.-in. @ 22,813rpm (O.S. pipe @ 95mm/25% nitro) 47 oz.-in. @ 18,766rpm (open exhaust/5% nitro)

RPM ON STANDARD PROPELLERS

Open exhaust	7x6 Taipan—19,133 7x4 Taipan—24,481
---------------------	--

Manufacturer: O.S. Engines Mfg. Co. Ltd. Osaka, Japan
U.S. distributor: Great Planes Model Distributor,
P.O. Box 9021, Champaign, IL 61826-9021;
(217) 398-3630; fax (217) 398-0008.

PERFORMANCE EQUIVALENTS

	Open exhaust 5% nitro	95mm pipe 25% nitro	65mm pipe 25% nitro	65mm pipe 50% nitro
B.hp/cu.in.	5.95	6.92	7.92	9.50
B.hp/cc	0.36	0.42	0.48	0.58
B.hp/lb.*	1.94	1.70	1.94	2.33
B.hp/kilo.*	4.28	3.74	4.28	5.14
Oz.-in./ci	222.80	280.10	258.00	303.40
Oz.-in./cc	13.60	17.60	15.60	18.50
Oz.-in./lb.*	72.60	70.90	62.70	74.40
Nm/cc	0.097	0.124	0.112	0.133
B.hp/sq. in. (frontal area)	0.20	0.24	0.27	0.33

*These ratios include weight of tuned pipe and header.

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NITRO NEWS

a significant increase of rpm levels to the 33,000 area or more).

■ Manufacturers test engines with non-EFRA, 50-percent-nitro fuel. (Even though EFRA now specifies a maximum of 25 percent nitro, manufacturers are still making the same hp claims.)

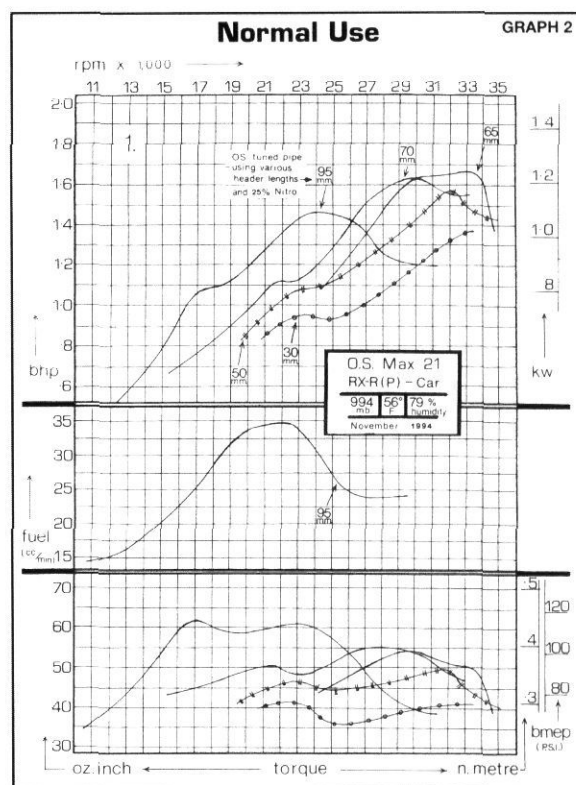
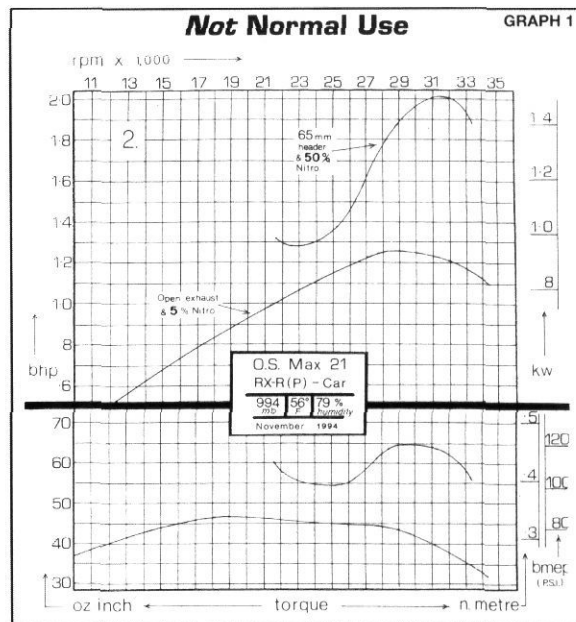
Test 7

O.S. pipe at 65mm; 50-percent-nitro fuel; oil as in Test 1; Model Technics F2 (extra cold) plug.

In view of my previous results and the O.S. .21 RX-R's inability, so far, to produce the claimed 2.2hp at 32,000rpm, I was really interested in doing this final test. Compared with results obtained when using 25-percent nitro, the immediate result was a considerable increase in torque. Engine response was still very smooth; this led me to believe that the effective compression ratio could be usefully raised when using the EFRA 25-percent-nitro fuel. If the compression ratio had been optimal for 25-percent nitro, using 50-percent-nitro should have caused overheating and reduced plug life, but this was far from evident. This shows a "soft" engine setup and suggests that higher performance is available at the expense of reliability.

The torque "hole" was very apparent in this test. Indications are that, with this fuel (50 percent), a pipe set at 95mm would produce considerable torque—above 70 oz.-in. near the 20,000rpm area.

For convenience, the results of this test and the earlier, open-exhaust one are shown together on graph 2; both are really in the "unusable" area in terms of actual racing.



SUMMARY

Not unexpectedly, the O.S. .21 RX-R displays O.S.'s exemplary construction standards; at the end of the tests, the engine's condition was still very good. But the harsh world of competitive car racing has its own

standards. In terms of sheer power, the engine seems to be significantly competitive and should fare well against the high-performance engines from Italy. If more top competitors use it, we'll soon see its popularity increase. ■

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Proper R/C Maintenance

THIS MONTH, I'll discuss the proper maintenance procedures for keeping your off-road R/C car or truck in top running condition. Nothing protects your



After running your car, clean it with a small paintbrush.

R/C investment better than good old-fashioned elbow grease. Not only does proper care of your R/C car stop parts from wearing unnecessarily, but it also makes for a better performing car or truck. There's nothing worse than replacing parts that are worn because of poor maintenance; it's an unnecessary waste of money.

Maintenance chores should be performed at four different times—after each run, daily, weekly and monthly. Let's start with the duties that need to be performed after each time you run off a battery pack.

AFTER EACH RUN

When you've pulled your car off the track, it's a good idea to pull the motor out of your vehicle. Remove the

springs and brushes from the motor, and inspect the brushes for excessive wear. If the brushes are more than half worn down, replace them. Also, if you've been running the motor with the same brush springs for a while, you may want to replace them, as well. Why, you ask? Because motors produce heat, and heat causes springs to lose their tension and

weaken over time. Weak springs can lead to arcing (when the brush jumps or bounces off the commutator), which may damage the commutator (comm). If the brushes are OK, use a fingernail file or some type of small, semi-abrasive file to remove the sharp edges from each side of the brush. Be careful not to remove so much of the brush that it loses its curvature. You just want the edges to be a little rounded to prevent the possibility of arcing.

Your next step is to inspect the commutator for signs of wear and tear. If there are no major pits or scratches, it's time to clean it and remove any carbon that has built up on its surface. Cleaning the surface creates a better contact patch for the brushes. The better the contact patch, the less chance there is of the brushes arcing, and that means less heat, more speed and longer run times. To clean the comm, poke a comm stick (an abrasive, "eraser"-type, comm-cleaning stick)

Get a can or two of high-quality motor spray to clean your motor. You may have heard that you can get away with using brake cleaner, but stay away from it. Some brake cleaners contain chemicals that will eventually eat away the epoxy that holds certain motor windings together.



through the brush hood, and place it against the commutator. Slowly rotate the comm (spin the pinion gear) and gently apply pressure to the comm stick. Don't press too hard when you're doing this, though; you may damage or distort the commutator surface.

Once you've performed this task, tilt the motor onto its side, with the endbell side (brushes and springs side) facing downward. Spray three or four quick shots of motor cleaner into the endbell openings. Do not douse the whole motor. You want as little junk as possible to run down into the motor housing or can. Let the excess fluid

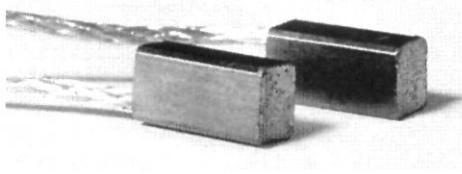
run out into a cup or a rag. You should also give a quick shot of cleaner to the bearing or bushing.

Next, apply a little lubricant to the bearing or bushing. Use only the lubricant that is made for bearings or bushings; there is a difference. Reassemble the motor. Make sure you've given the motor time to cool off before you run off another battery pack; heat is a motor's worst enemy. While you wait for the motor to cool, inspect the rest of the car or truck. Look for bent tie rods, loose nuts and bolts, missing E-clips (if your car uses them), or anything else that may be a warning sign that something major may break soon.

DAILY

At the end of the day, don't just throw everything into a heap on the workbench. Take the time to thoroughly clean the car, and most important, to clean the motor again. Believe me, if you don't clean the car but let it sit, when it's time to run it again, not only will you not want to clean it, but it will also be harder to clean. Take the motor out of the car and repeat the steps suggested for use after each time you run off a battery pack. If you run a modified motor, completely disassemble it and clean it piece by

When you clean your motor, check its brushes for wear and scratches. If they're more than half worn away, replace them.



When you've cleaned your motor thoroughly, you should always lube your motor's bearings with a high-quality bearing or bushing lube.

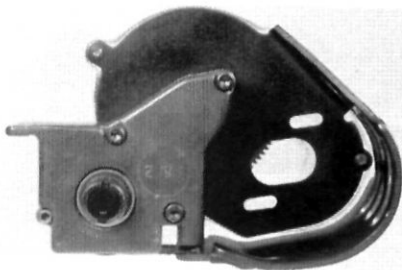


Wipe off the excess crud and then clean your shocks with a toothbrush. If oil is leaking out of them, the shocks should probably be rebuilt.

piece. Remember to reassemble it exactly as it was (it's very important to keep all the shims in their proper order!).

Before cleaning the rest of the car, inspect the shocks. An excessive buildup of dirt at the base of the shock can indicate that it's time for a rebuild. Use a toothbrush or small paintbrush to wipe all the dirt off the car, and be sure to get into all those nooks and crannies. Dynamite* has just released an interesting product that goes by the name "Wacky Tacky", it's a gooey R/C car cleaner, sort of like reusable Silly Putty that absorbs all

When you examine your tranny, look at the teeth; are any chipped or missing? And make sure that the diff is in good shape.



the crud on your car. The neat thing is that it can be used over and over again. It's definitely a time-saving tool!

Finally, inspect the car for broken, missing, or loose parts.

WEEKLY

Do weekly what you do daily. At least once a week, you should remove all the bearings or bushings in the car and thoroughly clean them with bearing cleaner or motor cleaner. After each spray of cleaner, rotate the bearing in your hand and feel for grittiness. As long as it still feels gritty, keep spraying. It is vital that all dirt be removed from the inner workings of each bearing. If you become lax at this process, you will have to dish out some cash for a new set of bearings very shortly. Again, use the appropriate oil to

lubricate the bearings or bushings. After cleaning the car, put the bearings or bushings back where they belong.

At this point, you should tear down your tranny to clean it and

check for wear and tear. Check for chipped or missing teeth, then inspect the differential (diff). Does the diff feel gritty as you move it? If it feels gritty and isn't perfectly smooth, then it's time to rebuild it. Sometimes, this only involves taking the diff apart and giving it a thorough cleaning and lubrication. If this doesn't do the trick, you'll have to buy some new diff rings and diff balls. In a tranny, tolerances are very precise. Once something becomes worn, performance is greatly affected.

While the gearbox is disassembled, take out and clean your bearings/bushings and re-lube them.

MONTHLY

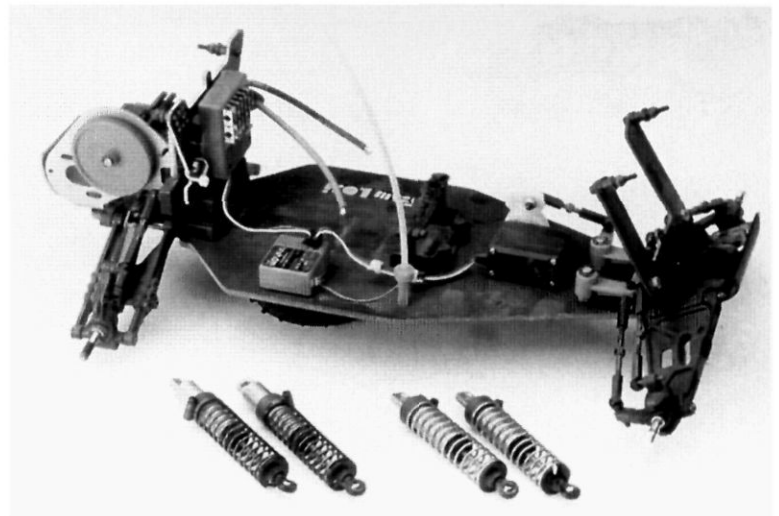
Once a month, take apart all the suspension components and clean all the pivot points. First, remove the shocks from the car and see whether the suspension arms fall under their own weight during their downward range of travel. If they don't, the suspension arms are binding somewhere. Remove the hinge pin, then the suspension arm. Clean out the inside of the suspension arm and check the hinge pin to see if it's bent or scratched. If the hinge pin is damaged, replace it before you reassemble the suspension arm.

Check your steering assembly for any excessive wear and, if need be, clean or replace any worn bushings or bearings.

One final note: always keep your instruction manual on hand. To this day, I still refer back to my manual for information.

* Addresses are listed alphabetically in the Index of Manufacturers on page 168. ■

Once a month, it's a good idea to tear down your car and check it thoroughly for wear and tear.



Dictionary

camber

the amount the top of a wheel tilts inward or outward from the chassis.

caster

the amount the center line of the wheel tilts toward the front or the back of the car.

connecting rod

the part that connects the crankshaft to the piston in gas engines.

differential

a device in the transmission used to deliver power to each wheel independent of each other.

direct drive

the pinion gear of the motor contacts the spur gear on the rear axle with no transmission in between. Most often found on pan-type on-road cars.

dogbones

a part used to connect the transmission outdrives to the wheel hubs.

double wishbone

shaped like wishbones, these devices are used to support the wheels, hubs and shocks. They also connect all these components to the chassis and are usually capable of up/down motions.

dremel

a high-speed hand tool used for cutting or trimming materials. Can also be used for drilling holes.



LRP Electronics LE 25 AMS MK II



THE EUROPEAN common market is a massive, powerful group of trading nations; and I wasn't surprised when a massive, powerful-looking ESC from Europe showed up on my front door. Made by LRP*, this racing-style controller is called the "LE 25 AMS

kind of reputation, the MK II was an exciting prospect for my "Scoping Out" test.

CURRENT-LIMITING ADVANTAGES

I read the instructions thoroughly and found that the MK II has many interesting—even unique—features. Perhaps the most interesting was the way in which LRP implemented the current-limiting circuit (see sidebar).

I took the MK II out of its case by removing four screws from the bottom. The top half was a little difficult to remove because it fit very tightly around the FETs and the motor and battery leads. This tight fit, along with a full set of rubber hole plugs, should go a long way toward sealing out dirt.

The well-built unit has two printed-circuit (PC) boards that are mounted piggyback with riser wires that are soldered into place (no connector to get flaky). The riser wires perform two functions: they mechanically support the auxiliary board

above the main board, and they pass signals between the two boards. The FETs are mounted on massive circuit runs (copper on both sides of the board), and the motor and battery wires are directly connected to the heavy copper connections. All the solder joints are of the highest quality.

One nice final touch was that the PC boards appear to have been sprayed with a clear, paint-like coating that helps to prevent the corrosion that can destroy solder joints and cause shorting.

TEST 1— RESISTANCE

All this sounded good, but I headed to the "Scoping Out" lab to see whether the MK II was a true purebred racing machine with world-class low "on" resistance. Low resistance is one of the most important features of a racing speed control because it has to handle enormous currents. With the new SCRC 1700mAh batteries, an average of 30 amps isn't unheard of. At 30 amps, a 0.06-ohm resistance would give a 1.8V drop across the speed control; but, even worse, the controller would have to dissipate 54 watts of power. Many soldering irons are rated at 45 watts or less, and you know how hot a soldering iron gets. A good racing speed control's resistance must be no more than 0.006 ohm. At 30 amps, this controller would be dropping only 0.18 volts with a power loss of only 5.4 watts.

With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its "on" resistance by dividing the measured

voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

• *Voltage drop along the full length of the battery and motor wires: 0.08 volt—a resistance of 0.006 ohm.*

• *Voltage drop 2 inches along the battery and motor wires: 0.04 volt—an amazingly low resistance of 0.0033 ohm.*

If you've been following this column, you know that this places the MK II in the pro class of the major American speed control manufacturers. The performance of this controller should be hot while its operation should be cool.

TEST 2— OVERHEATING

I "cook" every controller I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps. I usually install a heat sink for this test, but LRP's instructions said that a heat sink isn't necessary; besides, no heat sinks were provided. I also run this test without the benefit of cooling air (no fan). At the end of 15 minutes—the equivalent of dumping three or four battery packs without any cooling-off periods—I felt the FETs. They were just slightly above room tem-

WHAT IT HAS

- Seven FETs: six for forward and one for brakes.
 - Current limit (torque control) set by a pot or code plugs.
 - 13-cell capacity.
 - Three built-in pots to adjust neutral, full-speed and brakes.
 - Built-in, pulse-checking LED.
 - Quasi-high-frequency motor drive.
 - Forward-only with brakes.
- And of course, it comes with: instructions, pot-adjustment screwdriver, current-limit code plugs, current-limit pot and adjustment-hole plugs.

MK II." On the front page of the instructions, there's a list of nine European champions who have won major races with it. With this



perature. This was no surprise, considering the low resistance I had measured earlier; low resistance always means cool performance.

TEST 3— HANDLING A SHORT

In my dead-short test, I check to see whether the ESC could survive the heavy current it would have to withstand if a gear jammed or the motor fried. The current jumped to a respectable 40 amps (the limit of my bench supply). I held the FETs to check whether there had been any heat-

ing. After a minute, they were a little warm, but by no means hot—once again, a testimony to super-low resistance.

INSTALLATION

I read the installation instructions before I installed the MK II in my R/C car. They aren't very specific and don't include a picture of the hookup, which would be very helpful to a beginner; they do, however, have some specific words on which wire should be hooked where. There's no mention of the proper transmitter settings, but the instructions are quite detailed on adjusting the neutral, full-speed and brake pots. There are also very detailed directions on how to set the current limit. Having read the instructions, I installed the MK II in my faithful test car—a Kyosho* Sideways. This car currently sports a Peak Performance* 16-turn double modified motor. Between the mega power of this motor and the transmission's aggressive gearing, it's possible to spin the back wheels at will. For power, I installed an SCRC 1700mAh battery.

TRANSMITTER MATCHING

After I had installed the speed control, I matched it to my Futaba* Magnum AM transmitter. LRP provides a long, skinny screwdriver for the task. This screwdriver is essential because the pots are on the bottom printed-circuit (pc) board. The screwdriver must reach all the way down through a hole in the top of the case and through a hole in the upper pc board. The task is further complicated because the pots

are somewhat off-center, but when you get the screwdriver in the slot, the pots respond well, and you get a positive, accurate setting. The instructions are in millimeters—another hint that this is a European speed control. For example, the instructions tell you to set full throttle at 3 to 4mm before the transmitter throttle reaches the end. Of course, this turns out to be the old standard of setting the full-throttle point at about 80 percent.

When I first turned the MK II on, the motor would run only when I pushed the trigger forward (applying brakes). To fix this, I had to flip the throttle-reversing switch. This is no big deal, unless your transmitter doesn't have a throttle channel-reversing switch, in which case, the MK II might not work.

READY TO ROLL

Acceleration was explosive, top speeds were ripping, and the brakes had enormous bite. I ran the battery to a full dump. As described in the instructions, this controller has a "soft-dump" mode. When the battery voltage decreases (and, as we all know, Ni-Cds dump almost instantly), the MK II goes into a "soft-run" mode, which reserves enough power to keep the receiver and the steering working and the car moving (although not at any great speed). This is great for getting a car to cross the finish line just one more time when you're ahead and the 4-minute buzzer has sounded. More than once, I've seen a car that was only 6 feet from the finish line veer into the wall while another car went screaming by to

win the race.

I made the first run with the current limiter turned off (maximum punch) and the brakes set to maximum. This is great for wheel-spinning, brake-slammings fun, but it's not the ideal setup for winning races. So, on the second run, I reduced braking to minimum and turned the current-limiting pot to 10 amps. The car was very well-behaved. Acceleration was tame, and the brakes were, too. Still, it wasn't the best setup for racing, so I jacked up the current limit and stiffened the brakes until the car was once again a screamer; but it was then actually faster around my imaginary racecourse. With the violent wheelspin under control, I tended not to spin out in the corners or swap ends when I applied the brakes. I removed the current-adjustment pot and tried the color-coded plugs. First, I tried the black plug, which gives maximum amps. Once again, I was back to wheel-spinning, jamming performance. Next, I tried the yellow plug, which is the lowest current rated (35 amps). The car was controllable, but performance was a little off. The red, 45A plug worked best.

CONCLUSION

The MK II's resistance is truly world-class. It ranks with the two or three best controllers I've ever tested. LRP is so convinced of the MK II's ability to handle heavy current without heating, they don't recommend or even provide heat sinks. The FET heat tabs, however, are on a standard spacing so that a standard heat sink from Novak* or Tekin* will fit. Just be careful if you decide to run a heat sink,

SPECIFICATIONS

DIMENSIONS

Height	0.76 in.
Width	1.42 in.
Length	1.61 in.
Weight with wires	2.2 oz.

TUNING

Access to controls	Very good
Ease of adjustment	Good

LIST PRICE/WARRANTY	N/A
---------------------	-----

MANUFACTURER'S SPECS

Max. voltage	15.6 volts (13 cells)
Min. voltage	N/A
Continuous current	Unlisted
Resistance	Unlisted

TEST RESULTS

Voltage	6 volts
Current	12 amps

• Voltage drop	
—along length of battery and motor wires	0.08 volt
—2 inches along wires	0.04 volt

• Calculated Resistance*	
—along length of battery and motor wires	0.006 ohm
—2 inches along wires	0.0033 ohm
BEC voltage, 6-cell pack	5.68 volts

*Resistance = Voltage drop ÷ current

COMMENTS: this controller has world-class low resistance. This shouldn't be too surprising, because the MK II has helped many racers win European championships. The MK II has a unique current-limit-setting scheme. You can use either a plug-in calibrated pot or the color-coded code plugs.

Acceleration was great, and top speeds were hot. The MK II is rated for 13-cell operation, so if you're into insane racing, this could be the do-it-all controller for you. Bottom line: the MK II is a first-class, pro-model, racing speed control.

What's DIFFERENT

Most speed controls that have current limiting also have an adjustment potentiometer (pot) built in. To set the current limit, they have either a calibrated dial or a test point (of course, a few are digitally programmable). The MK II, however, gives you two ways to adjust the current limit. The first is by plugging in a calibrated pot (as shown in the photo of the MK II). This pot has a screwdriver slot and a pointer. It's a simple matter to dial in anywhere from 0 to 100 amps.

The second way to set the current limit is with code plugs. The MK II comes with a set of five code plugs that are installed in place of the pot. According to the instructions, they limit the current as follows:

- **Black = no limit**
(good for drag-racing and wheel-spinning fun);
- **White = 80 amps**
(recommended for 4WD);
- **Green = 60 amps**
(recommended for 2WD);
- **Red = 45 amps**
(recommended for stock and slippery tracks);
- **Yellow = 35 amps**
(recommended for 1/12 scale and very slippery tracks).

The code-plug method appears to me to have great promise because it's simple and repeatable. With experience, you'll learn which color plug to use with which track conditions, and it will take only a second to change the plug. The only problem I see with this setup is choosing the right plug if you're colorblind. Of course, you could simply mark the current setting on the plug.

The MK II also has an output lead for driving a FET servo and a red-and-black lead for directly connecting an auxiliary battery pack. Generally, an external receiver battery pack is plugged directly into the receiver and must have its own on/off switch; but the MK II allows you to feed the power of the external battery pack directly into the speed control, and that allows the same on/off switch to control both the external receiver pack and the MK II's BEC supply. Also, if the external receiver pack goes dead, the MK II will automatically swap over to the BEC and operate normally until the car's motor battery goes dead; there's even an indicator light that tells you which pack is being used.

because the brake FET is offset but not separated from the forward FETs. If you short the brake FET to the other FETs, you'll destroy the MK II.

I like the idea of the code plugs because they allow you to change the current limit in steps until you find what works. From then on, for a certain car at a certain track, the same color-coded plug should provide that just-right feel without

any guesswork. The range of the brake adjustment was impressive and should cover any track conditions.

In the instructions under "Features," the MK II is described as having "2500Hz motor drive frequency modulated on top of a base frequency." This implies that the MK II is a high-frequency speed control; but it's not quite. When I tested it, I observed the motor-drive

voltage on my oscilloscope. It's a combination of a 60Hz (the base frequency) and a 2500Hz (high-frequency) signal. This means that it isn't a pure high-frequency controller. In an actual driving test, however, the controller was very smooth. In fact, when I had it in the max-current mode, I was able to control wheelspin by squeezing the throttle. The MK II has excellent drivability.

A feature that's described in detail in the instructions, but that I didn't have time to test, is the MK II's capacity to accept an auxiliary receiver battery. Some racers like to run a separate receiver battery to save the extra juice that the receiver and servo use. This is usually done by removing the red wire from the receiver plug and plugging the external receiver pack directly into the receiver. With some ESCs, you can simply leave the controller's power switch turned off and plug in the external pack. But on the MK II, the external receiver battery is connected to a small black-and-red wire that sticks out of the case. The MK II's on/off switch controls both the motor battery pack and the auxiliary receiver pack.

One last, pleasant surprise I found in the instructions was that the MK II will handle up to 13 cells. Most high-performance controllers that I've tested are limited to 10 cells. If you are into insane racing, this could be the do-it-all controller for you.

Bottom line: the MK II is a first-class, pro-model, racing speed control.

**Addresses are listed alphabetically in the Index of Manufacturers on page 168. ■*

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Kyosho

BMW M3 GTR

by Frank Remick

IN TODAY'S growing gas market, the number of available on-road gas cars seems to increase weekly, so choosing a car is difficult. Well, don't fret; Kyosho* just made it easier. Their 4WD GP-10 comes in three styles—Mercedes-Benz, Toyota and BMW—and I chose the BMW. Just by looking at the box, I could tell that this car would be *cool*.

KIT FEATURES

The car has independent front and rear suspensions and front and rear differentials—a

disk brake and a two-speed drive system—and the kit includes an engine. Does this sound good? There's one more thing: the chassis comes one third assembled. You only have to bolt on the A-arms, paint the body and install the radio gear, and you're off to tear up the parking lot.

Having checked out all the kit's cool features, I looked more closely at the car's construction and how it was laid out. The main chassis, which is very sturdy and well-designed, is the same as the one on the Inferno 10 off-road car. It's made out of blue-anodized aluminum.

Molded of Kyosho's high-impact plastic/nylon material, the rest of the car's gear



AUTOBAHN Burner

train also comes from the Inferno 10. Unlike the Inferno 10, though, the GP-10 features a very nice, simple, 2-speed transmission that's bolted in place of the Inferno's center differential. The GP-10's A-arms are from the Optima Series of cars, and I especially like the up-travel limiters built into them.

Power for this road burner is supplied by Kyosho's own GS-11 pull-start .11 engine, which has a good-size heat-sink cooling head (you usually have to buy a head as an aftermarket part). It's interesting that the engine is bolted directly onto the chassis—no engine mounts. This works well, but if you want to upgrade the engine later, you

SPECIFICATIONS

Scale.....	1/10	Differentials.....	Gear type
List price.....	\$499.99	Bushings/bearings.....	Bushings
DIMENSIONS			
Length (overall).....	19.5 in.	SUSPENSION	
Width.....	9.8 in.	Type (F/R).....	Independent
Wheelbase.....	10.6 in.	Damping (F/R).....	Oil-filled shocks/ coil-over springs
Track (F/R).....	9.5 in.	WHEELS	
WEIGHT (gross).....		Type (F/R).....	Two-piece mesh
		Dimensions (F/R).....	76x36mm
CHASSIS			
Type.....	Stamped flat pan	TIRES (F/R).....	
Material.....	Aluminum	Low-profile, real rubber with tread	
DRIVE TRAIN			
Type.....	Gear/shaft drive	POWERPLANT	
Primary.....	2-speed	Engine.....	Kyosho GS-11
		Pipe.....	Muffler
		Carb.....	Barrel type

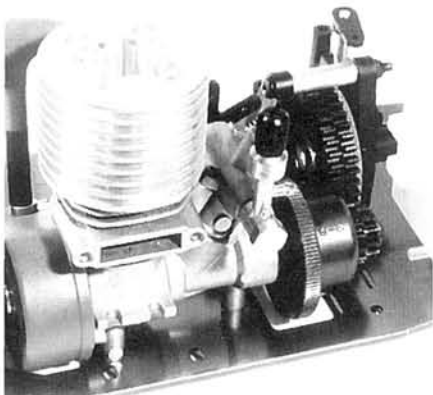
will have to buy some mounts as well.

The outside of the nicely detailed body comes coated with a film that protects it from overspray. To follow the color scheme shown on the box, simply paint the car white and use all the supplied decals. The decals aren't easy to apply, but it shouldn't be beyond the abilities of anyone who's creative and has a little patience. With some of the larger decals, use a decal-application fluid such as the one sold by Autographics*. I think it's impossible to apply these decals without having a few wrinkles; just don't worry about it.

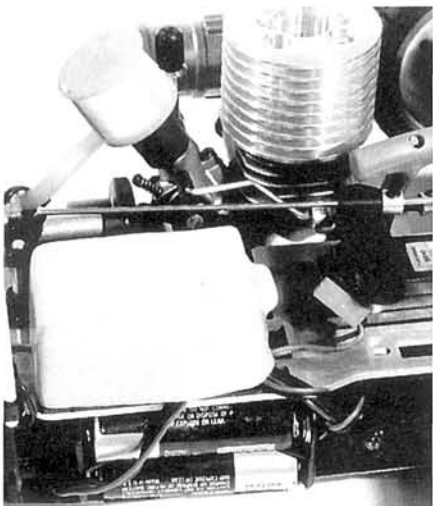
The body posts are cool innovations—no body pins to get lost. The posts use a spring-loaded cam to hold the body down, and the system seems to work well while being really easy to use. Definitely cool!

TEST GEAR

I chose to use my new Airtronics* 3PS radio; I also used an Airtronics 94151 steering servo and an Airtronics 94737 servo for the throttle. To power the radio, I used the



The 2-speed transmission works well—adds performance and a "Wow" factor! The over-size cooling head really keeps the engine cool (a real bonus).



With a gas car, a receiver cover is a must.



4-cell cage that came with it and installed alkaline batteries. To keep fuel out of the receiver, I also added a Kyosho receiver cover, which is a must.

PERFORMANCE

After breaking-in the engine according to the instructions, I took my GP-10 out to my club's parking-lot race to see how it would perform. I broke in and then leaned out the engine to see what it would do, and at this point, I had to adjust the 2-speed tranny, which seemed too tight and just wouldn't shift. Others who have built these cars have found the opposite; they thought the 2-speed shifted too early. Whatever the case, it's easy to adjust it. With the supplied wrench, I backed off (unscrewed) the adjustment screw about one full turn. This screw controls the rpm at which the 2-speed

shifts into second gear. Having adjusted the tranny, I found the GP-10 a blast to drive, especially on slippery surfaces where its 4WD helped make four-wheel drifts easy to do. Whenever the 2-speed shifted, onlookers were obviously impressed.

Another impressive feature was braking power when going from full speed to a dead stop. The car has a central disk brake that applies the brake to both the front wheels and the rears and makes the car stop from full speed in less than 20 feet.

As far as overall speed goes, I think that the GP-10 could use a bit more power; it comes with a steel flywheel, which robs the

THINGS YOU'LL NEED

- 2-channel radio with two servos, a receiver and a receiver pack.
- Assorted tools, such as a Phillips-head screwdriver, needle-nose pliers, etc.
 - Glow-plug igniter.
 - Fuel bottle and fuel.

- Kyosho's instruction manuals are usually very good, and the one that came with this kit was no exception. Follow it exactly; the sequence of steps is logical.
- Use thread-lock everywhere the manual tells you to use it.
- Check the pre-assembled chassis parts to make sure that all the screws have been fully tightened.
- Take the front and rear gearbox inspection plates off the bottom of the chassis, and grease the inner ring and pinion gear with a regular grease, not a silicone lube. I used Ronnie Grease from Paris Racing*. I also greased the underside of the inspection plates to create a seal and keep dirt out.
- Use a heavier shock oil; I think that the supplied oil is too light, so I used Trinity* 50WT silicone in all four shocks.
- Take the gearboxes off the car, disassemble the differentials, and fill their insides with a heavy grease or heavy silicone fluid. I used Trinity silicone damper fluid, which is really thick. By doing this, you'll prevent the differentials from unloading in the turns and robbing the car of power and handling. The grease slows the diff action and puts more power to the ground in tight corners.
- I recommend that you change the fuel tubing; use a larger size. I chose Dynamite's* fluorescent green tubing.

**Building and
Setup Tips**

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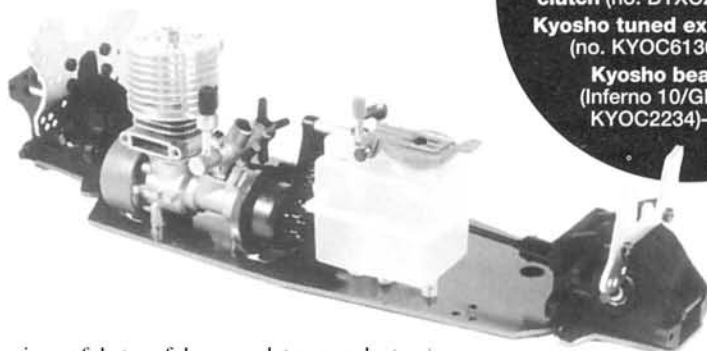
Of course you do, but naturally you don't want to spend a "ton o' bucks" to do it!

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KYOSHO BMW M3 GTR



engine of lots of low-end torque but, because of its weight, makes the engine idle smoothly. If you installed an aluminum flywheel and a tuned exhaust system, I think you'd be surprised by how much

FACTORY OPTIONS

Receiver cover

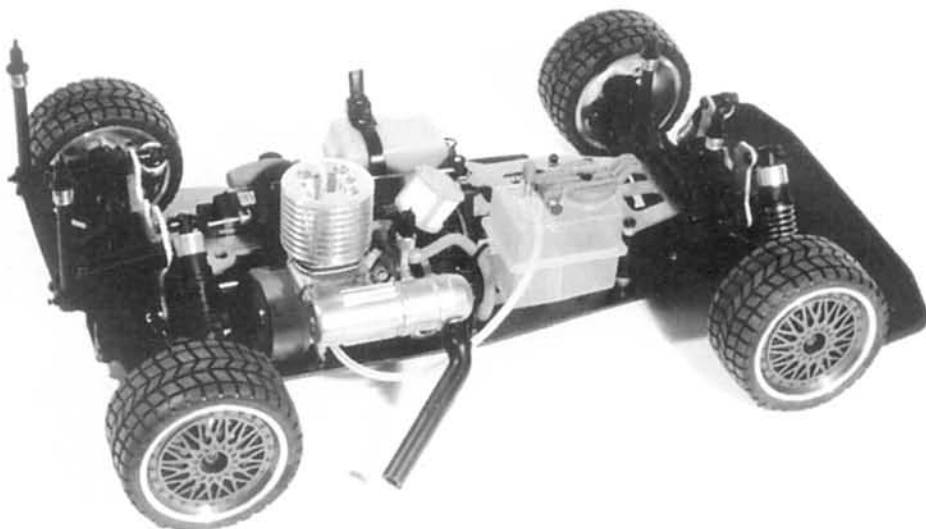
(part no. KYOC4885)—\$7.99

DuraTrax® lightweight 4-shoe clutch (no. DTXC2541)—\$29.99

Kyosho tuned exhaust system (no. KYOC6136)—\$77.99

Kyosho bearing set (Inferno 10/GP-10; no. KYOC2234)—\$42.99

When the car arrives, at least a third of the assembly work has already been done; this saves at least 1½ hours of building time.



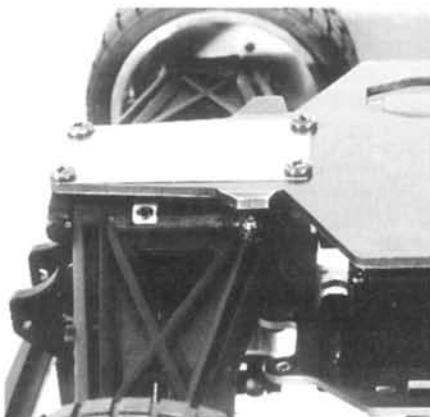
more acceleration and top end the engine would have. What the engine lacks in power, it more than makes up for with reliability and ease of use. Initially, it started on the fourth pull of the pull-starter, and it

has started with one or two pulls ever since. This is rare among engines of this size, and Kyosho is to be commended.

As far as overall handling goes, I have to say that the car is very easy to drive because it's a 4WD and has independent front and rear suspension. The kit's low-profile tires provide plenty of traction on just about any surface, and the rims look great, too.

FINAL THOUGHTS

This has to be one of the top gas car kits on the market—especially for what you get and how easily it all goes together. It could use some of the available optional accessories to spice up its top speed and acceleration but, right out of the box, it's perfect for newcomers to gas power. Kyosho has given us another winner.



Another of this kit's stand-out features: travel limiters in the suspension arms.

**Addresses are listed alphabetically in the Index of Manufacturers on page 168.*

Kyosho Pro-XRT Team Truck

by George Gonzalez

AFTER MUCH ANTICIPATION, Kyosho's* new 1/10-scale electric racing truck—the Pro-XRT—is now available. The XRT is based on the race-proven design of its gas-powered brother—the Outlaw Rampage Pro—and, as the word “pro” might suggest, the XRT is loaded with all the trick stuff that seasoned racers demand in a racing truck. Kyosho has also added several unique features and topped the whole thing off with a low price.

KIT FEATURES

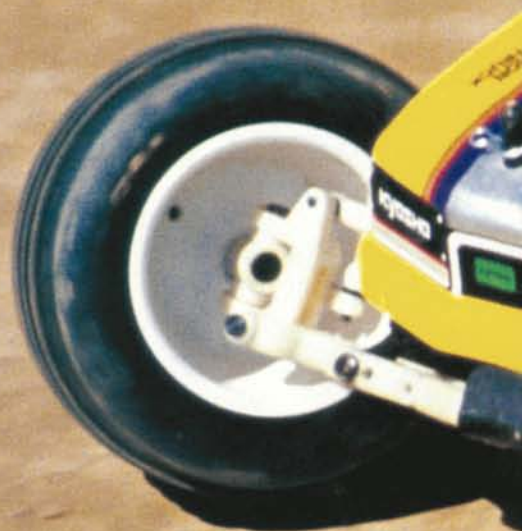
The XRT is designed around an all-new, super-rigid, three-piece, composite chassis that's molded of Kyosho's tough, new Kelron-II material. The chassis is molded into a reinforced tub and is supported by a molded upper deck; the upper deck also stiffens the front suspension and bellcrank steering system. The chassis comes with a solid, one-piece front bulkhead that provides a 30-degree front kick-up. For added convenience, the chassis also features a built-in ESC tray and a swing-away battery hold-down that makes battery changes quick and easy.

The bellcrank steering system comes with ball bearings; it has an incredibly long throw for maximum steering, and it mates perfectly with the front steering blocks to provide excellent geometry. The kit also includes a spring-loaded servo-saver (for those

unexpected meetings with the washboards) and a set of universal servo mounts that will accommodate most servos.

The truck comes with a 4-wheel, independent, double-wishbone suspension that incorporates extra-long, anti-flex arms on all four corners. The front steering blocks feature 6mm stub axles that are 50 percent larger than those in previous kits; this allows the larger 6x10mm ball bearings to be installed in the wheels. According to Kyosho, the larger stub axles and bearings increase strength as well as improve steering precision. With the supplied 1 to 4mm spacers, the rear hub carriers can be moved forward or backward; this allows the wheelbase to be either increased or decreased in small increments (seven wheel positions are possible).

The rear arms are connected to the chassis with Kyosho's unique floating-ball hinge pins. The hinge pins fit into nylon balls that are seated in the mounting blocks; this keeps the arms



SPECIFICATIONS

Scale 1/10
List price \$269.99

DIMENSIONS

Overall length 16.5 in.
Width 12 in.
Wheelbase 11.5 in.
Track (F/R) 10 in.

WEIGHT (gross, w/battery) 4 lb., 1 oz.

CHASSIS

Type Molded tub with upper brace
Material Kelron II

BODY

Type Stadium truck
Material Polycarbonate

DRIVE TRAIN

Type Gear
Primary Pinion/spur
Transmission 3-gear (output ratio 2.95:1)
Differential Ball diff
Bearings/bushings Bearings

SUSPENSION (F/R)

Type Lower A-arm, upper camber link
Damping Oil-filled, coil-over shocks

WHEELS (F/R)

Type One-piece nylon with Lexan dirt shield
Dimensions (DxW) 2.2x2 in.

TIRES

Front 4-row rib
Rear Mini-pin and dash combination

ELECTRICS

Motor, battery, speed control Not included



Samurai Stadium Warrior

KYOSHO PRO-XRT TEAM TRUCK

properly aligned and prevents them from binding. The system also allows quick and easy rear toe-in adjustment.

The truck comes with a complete set of Kyosho Ultimate shocks. To avoid oil contamination, the hard-anodized, Teflon-coated shock bodies have rubber dust boots and wiper seals; and rubber inner seals and two-piece shock caps prevent air bubbles from forming. The kit includes several different shock pistons for precise track tuning and a complete set of snap-on adjuster clips for

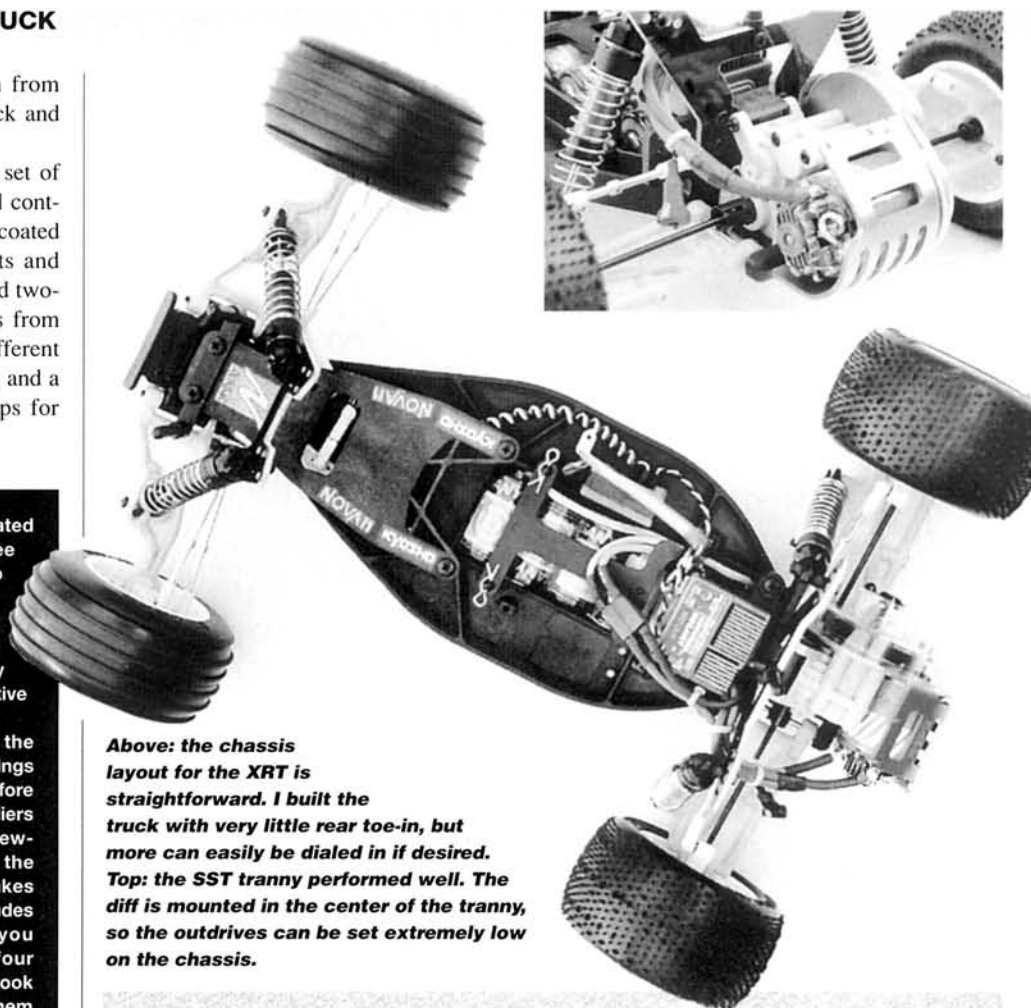
Building and Setup Tips

The XRT is a highly sophisticated racing truck, and some degree of R/C knowledge is required to build the kit. The instruction manual has excellent illustrations and full-size hardware identification charts for every step, but they aren't an alternative to reading the text.

The assembly starts with the shocks: to better seat the O-rings and collars, lightly oil them before installation; use needle-nose pliers and a small-tip, flat-head screwdriver to install the C-clip in the groove on the shocks (this takes some practice, but the kit includes extra C-clips just in case you launch one into space). All four shocks are the same size and look identical, so it's easy to get them mixed up; I used my Dremel to put a slight groove on the front shocks so I'd know which was which.

Next, I assembled the tranny. Be extremely careful when you build the diff; don't over-tighten the 2.5x25mm cap screw that adjusts the diff tension because that could damage the molded diff nut. It's best to make the final diff adjustments gradually at the track; it takes a lap or so to get the diff properly seated. After I had finished assembling the tranny, I noticed that some of the gears had flat spots that made the tranny bind. It took a couple of battery packs to break the gears in properly, but the tranny is now as smooth as silk.

My kit came with a complete set of supplemental ball joints, which were to be used to replace the ones that came with the kit. I used the supplemental ball joints (as instructed), but I noticed that the molded ball cups fit very tightly. This caused the entire suspension and steering system to bind up severely; naturally, I was concerned. I gave the folks at Kyosho a holler, but they were already aware of the problem and have since corrected it. Unfortunately, a few of the early production kits left the factory with this flaw. If your kit has this problem, give the folks at Hobbico/Great Planes* a call; they'll send you a replacement set along with their apologies.



Above: the chassis layout for the XRT is straightforward. I built the truck with very little rear toe-in, but more can easily be dialed in if desired.
Top: the SST tranny performed well. The diff is mounted in the center of the tranny, so the outdrives can be set extremely low on the chassis.

THE COMPETITION

	Double-XT	RC10T	SRT	Schumacher Storm 2000	Pro XRT Team
Wheelbase (in.)	11.000	11.375	11.375	11.300	11.500
Front width (in.)	12.000	12.375	12.375	12.25	12.000
Rear width (in.)	12.600	12.500	12.375	12.25	12.000
Weight (RTR)	4 lb., 2 oz.	3 lb., 9.5 oz.	4 lb.	3 lb., 13 oz.	4 lb., 1 oz.
Chassis	Stiffzell composite	Aluminum	Graphite/fiberglass	Fiberglass	Kelron II
Slipper	Hydra Drive	Friction Slipper	Friction Slipper	Friction slipper	Friction slipper
List price	\$349.95	\$335	\$335	\$399	\$269.99
Available at*	\$190	\$170	\$175	\$259	\$170
Reviewed	1/95	8/91	2/95	10/94	6/95

* Estimated average

quick and accurate spring-rate adjustment. Also, the shocks' molded spring retainers are vented to keep dirt out—pretty trick.

The Super Sprint Transmission (SST) uses 11 ball bearings for super-smooth operation, and it has a centrally mounted ball diff for quick and easy adjustment (no disassembly required). The tranny has a super-low 2.95:1 gear reduction, so it can handle the hottest modified motors, and it has a thrust-bearing-assisted slipper clutch, so it gets the power to the ground smoothly. A set of universal dogbones is also included, and you can change spur gears without changing the slipper adjustments (a feature you'll grow to love).

Other features include: 22 ball bearings;

a complete set of adjustable turnbuckles; one-piece nylon wheels with Lexan dirt shields; four-row rib racing truck front tires; dash/mini-pin rear racing truck tires; and a Lexan stadium-truck body with separate number plates and a separate rear spoiler.

TEST GEAR

An Airtronics* Caliber 3P transmitter sends the signals to a Novak* NER-3FM receiver. A Futaba* S9301 servo faithfully provides the steering chores. An Orion* turbo-matched, 1700mAh, 6-cell, stick pack provides the power while a Novak Racer ESC provides the power management. A Maxtech* 13-turn modified motor delivers the mondo horsepower.

likes

- State-of-the-art molded tub chassis.
- Extra-beefy, fiberglass shock towers offer a multitude of shock and camber-rod mounting choices.
- Hard-anodized, Teflon-coated shocks are among the smoothest I've tested.
- Super-smooth, ball-bearing steering system.
- SST transmission is extremely smooth and easy to adjust.
- Excellent tires (work great on hard-packed surfaces).
- Excellent handling.
- Excellent factory support.

dislikes

- Tie rods aren't very strong and are easily bent.

PERFORMANCE

I peak-charged a few packs and headed out to the track. It took one lap to get all my trims in order, another lap to get the diff seated and working properly and a couple of patch outs to set the slipper clutch to slip for about 2 feet before kicking in the

ponies. The kit-supplied tires hooked up nicely on the hard-packed surface, and it wasn't long before I was launching off the tabletop jump at full speed.

The first thing I noticed was how subtle the ride was; the truck was quiet, smooth and refined. The suspension did a great job smoothing out the rough stuff, and the tires seemed to remain planted at all times. I noticed that the suspension felt a little firm, but it proved to be the perfect setup for the brutal track conditions. The truck went through the doubles and triples time and time again and never once

ended up on its lid. It got through the tight sections of the track quite nimbly, and it was hell on wheels as it went down the massive straightaway. I couldn't help but crack a smile every time I hit the giant tabletop jump; I found that the truck handles equally well in the air and on the ground.

THINGS YOU'LL NEED

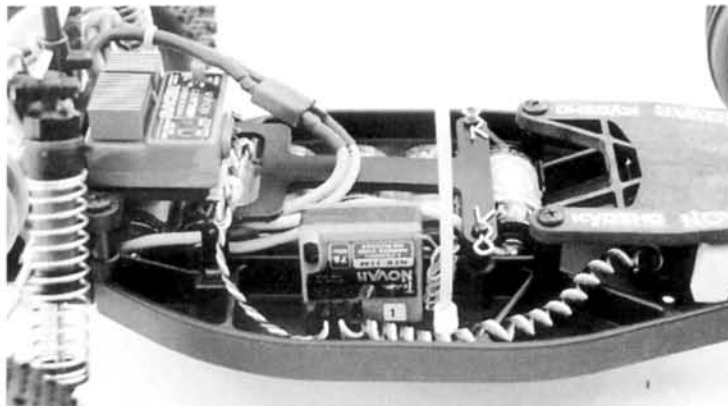
- Motor
- 6-cell battery pack
- ESC
- Radio gear
- Steering servo

FACTORY OPTIONS

- Transmission top shaft for Hydra Drive—part no. KYOC4220.
- 10-degree front hub—KYOC3710.
- 15-degree front hub—KYOC3711.
- Lightweight aluminum front-wheel shafts—KYOC3897.
- Lightweight aluminum kingpins—KYOC3895.
- 78-tooth, 48-pitch spur gear—KYOC5912.
- 82-tooth, 48-pitch spur gear—KYOC5911.
- Kyosho also offers colored shock caps and a complete line of springs for their Ultimate shocks.

Here we can see the super-long rear A-arms and universal drive shafts. Notice the multitude of upper shock-mounting holes on the shock tower.

Because the XRT's chassis is rather narrow, mounting the electronics was a little tricky. I used servo tape to mount the receiver on its side, and I mounted the ESC on the shelf above the battery pack.



FINAL THOUGHTS

The Kyosho Pro-XRT is a true driver's truck that offers rock-solid consistency. Despite its sophistication, it's surprisingly easy to dial in, and that means you'll spend more time honing your driving skills and less time trying to make the truck work. It comes with all the trick stuff, so the only other thing you'll need to make it to the A-Main is some practice. If you're in the market for a pro-level racing truck, give the Kyosho Pro-XRT a hard look.

*Addresses are listed alphabetically in the Index of Manufacturers on page 168.



Tamiya **AMG Mercedes Benz** **C-Class DTM D2** by Stan Van Druff

When it comes to
"bang for the
buck," the Tamiya
Mercedes-Benz
rates highly. It
performs well,
but if you want,
you can use the
factory options to
upgrade to an
even higher class
of performance.

I'M DREAMING that we're riding in Uncle Karl's silver Mercedes, cruising through the country, listening to Brahms' *Ein Deutsches Requiem* on the car's \$3,000 stereo. Suddenly, I bolt awake as I realize I'm approaching a hairpin turn at 100mph, and I have the wheel! I pound the brake pedal into the floor and downshift fast! I enter the turn and then floor it. Thanks to 4WD, the car never slips, but it does go up on two wheels. The Silver Streak has never let me down, but hang on tight, because we have to make up the time that was lost in the dream sequence.

Sure, writers tend to start reviews by imagining what it would be like to pilot a full-size machine to first place in the Grand Prix, the Indy 500, or an exotic road rally. But when you get a chance to play with a beautiful scale racecar like the Tamiya* Mercedes-Benz C-Class DTM D2, you can't always keep your imagination in check.

KIT FEATURES

Tamiya produces beautiful scale cars that look great on the road and the track. This Mercedes is a good example. Its body sports a molded-chrome grill and hood ornament, as well as a black plastic spoiler and rearview mirrors. A huge windshield wiper keeps the glass clean, and the detailed lights, door handles and air scoops will delight any model builder.

Under the hood, so to speak, the kit is equally impressive. The 4WD unit includes a ball differential in the rear with an inexpensive but adequate gear diff up front. The stiff, molded, tub chassis resists being bent and twisted and has a substantial bumper to protect the front end. The motor's mid-mounting position keeps it safe from rear-end collisions. Both shock towers are made of a thick but flexible plastic. Although that makes the suspension slightly spongy, these shock towers won't shatter like an abused fiberglass or graphite tower can.

TEST GEAR

I bought myself an Airtronics* Caliber 3P radio system, and I installed it in the Mercedes—along with an Airtronics 94102 steering servo. Although the kit comes with a 3-step mechanical speed control, I used my inexpensive Tekin* Sport TSC 408 controller. I used Dean's* Ultra Plug connectors to hook the speed control to a Trinity* Green Machine II stock motor instead of the kit's stock motor. To juice the whole thing, I used Parma* matched 1400 SCR batteries. Otherwise, I tested the car in its stock form.

This Ain't Your Mommy's Benz





SPECIFICATIONS

Scale 1/10
List price \$247

DIMENSIONS

Overall length 17.5 in.
Wheelbase 10 in.
Width (F/R) 7 in.

WEIGHT (gross, ready to run) 3 lb., 4 oz.

CHASSIS

Type Molded tub
Material Plastic

DRIVE TRAIN

Type Sealed gear drive
Primary Pinion/spur
Transmission Gear
Rear differential Ball
Front differential Bevel gear
Slipper clutch None
Bearings/bushings Bushings

SUSPENSION (F/R)

Type Independent A-arm
Damping Oil-filled, coil-over shocks

WHEELS (F/R)

Type One-piece plastic
Dimensions (DxW) 2x1 in.

TIRES (F/R)

Type Slick tread

THINGS YOU'LL NEED

- 2-channel radio system
- Steering servo
- Battery pack
- Battery charger
- Lexan paint for the body

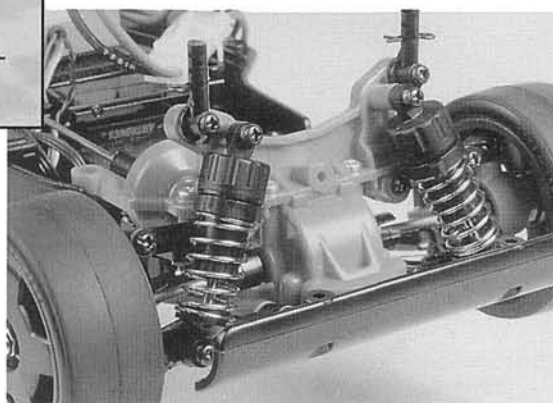
FACTORY OPTIONS

- Ball bearings.
- A wide range of pinions.
- Ball diff for the front.
- Universal shafts.
- Hardened-steel propeller shaft.
- Aluminum shocks.
- Coil springs.
- Stylish plastic or aluminum wheels; choice of street and off-road rubber.

Tough plastic components make this a rugged, inexpensive chassis.

PERFORMANCE

When it comes to "bang for the buck," the Tamiya Mercedes-Benz rates highly. Four-wheel-drive cars are always fun, but they're usually expensive because of their greater complexity. Well, Tamiya has kept the cost down, and if you've never driven a 4WD, you're in for a treat. The Mercedes accelerates quickly without much wheelspin, and it doesn't spin out easily. You'll find yourself pushing



The small shocks and shock towers are plastic, and the suspension works surprisingly well.

harder into the turns and hitting the power earlier when leaving them. When the Mercedes does break traction, it's control-

It's a Tamiya, isn't it? So, of course, the parts are well-labeled, easy to identify and fit together perfectly. Instructions are superb; even a beginner could put it together. I do have a few tips, though.

- Be sure to liberally grease the tranny and all the bearings as you assemble the kit. The only place I had any trouble was in building the shocks. For some reason, I had a tough time getting all the air bubbles out of the oil. Be patient here, because if you trap a lot of air, the shocks won't work properly.

- The full-size C-Class Mercedes that this kit is modeled after is known as the *Silver Streak*. If you've ever seen an ad for the car, or if you've seen the box art, you know why; it's solid silver from stem to stern. The sponsor—D2—has its logo painted in white all over the body, and the stock decals help you to reproduce the original. I spent about two hours cutting those tiny white letters out of the decals. I then designed a paint scheme that complemented the blue in the decals. Although my paint job isn't faithful to the full-size *Silver Streak*, I once heard someone say that looking good is better than being good.

- Although the decals come with black trim for the door handles and window molding, it's hard to apply them to the curved surfaces. If you want a good-looking body, paint these details black, and leave off those decals.

- There aren't too many adjustments you can make when setting up the car. Box stock is fine for most of us, but if you want your suspension a little stiffer for slalom running, add an extra spacer or two to the shock springs.

LIKES

- Beautifully detailed body.
- Excellent instructions and high-quality construction.
- The driving experience is great; for parking-lot fun, it will be hard to beat.



DISLIKES

- Novice builders might find the number of decals overwhelming.
- The stock prop shaft is made of wire that's prone to wobble and isn't very efficient.
- I wish it came with a driver and cockpit like some of the other Tamiya 4WD models.

Team Losi TECH TALK

DON'T CHANCE IT!

Most racers are always trying to take weight out of their cars and trucks in as many ways as possible. The problem with this is that, in some cases, the overall strength of the vehicle is affected. When lightening your car or truck, one thing is strongly discouraged: don't use aluminum screws in the chassis of the Double-X or the Double-XT.

There are a couple of reasons for this. First, the "Stiffezell" material that the chassis is made of is very hard. This means that the threads are more difficult to cut in the holes. A steel screw is strong enough to do this, but an aluminum screw probably won't do the job; its head will usually snap off before it has been fully tightened. The second reason is that the modular chassis used on these two vehicles was designed to eliminate as many screws as possible to make the chassis lighter (see, we already did the work for you!). Because there are far fewer screws in the chassis, each one carries more of a load, and the truth is that aluminum screws just aren't strong enough in most of these locations. The result is a sheared screw that leaves you with a useless chassis because of a hole from which the threads can't be removed. So don't chance it! Stick with steel screws in the chassis on your Double-X and Double-XT.

TOO STICKY?

By now, you've probably had a chance to try the new Silver-compound tires from Team Losi. One of the first things that racers comment on is how sticky they are; initially, there are a few minutes of playing with them, sticking them to each other, sticking them together, etc. Then a racer mounts them up, runs them and comments on how much *traction* they have.

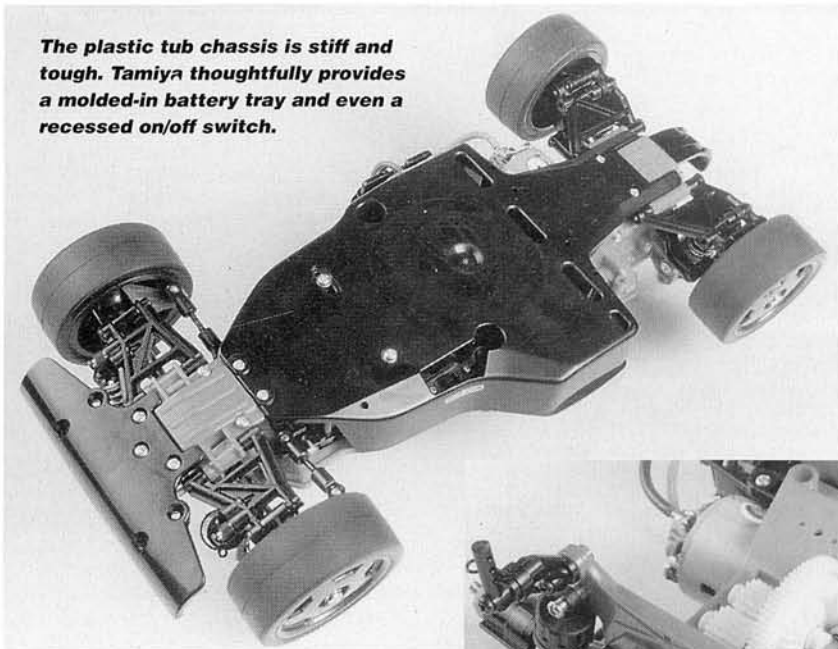
If you squeeze the edges of the tire after it has been mounted, you will notice that it sticks to the wheel. This can make up for inconsistent handling on bumps. A simple way to cure this is to sprinkle some baby powder on the inside of the tire before mounting it. This will prevent the tires from sticking to the wheels.

* * *

Let us know what's going on! Address your questions and problems to Team Losi, "Tech Talk," 13848 Magnolia Ave., Dept. J, Chino, CA 91710.

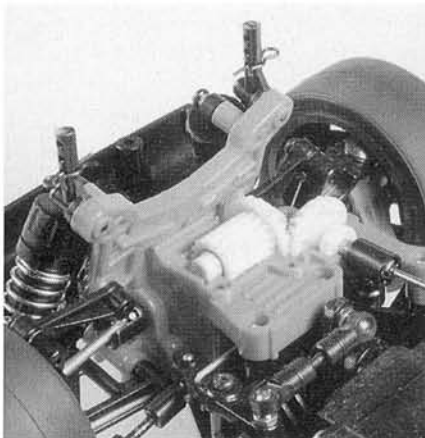
AMG MERCEDES BENZ

The plastic tub chassis is stiff and tough. Tamiya thoughtfully provides a molded-in battery tray and even a recessed on/off switch.



lable, and you can enjoy sliding around a curve without worrying that you'll lose it.

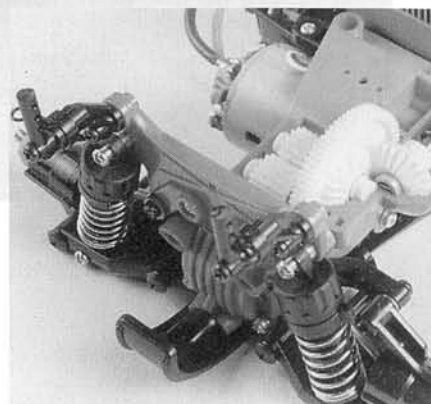
When I finish a new kit, the first thing I do is run it down my 400-foot-long driveway and hit the paved road at the end. I rip up and down the road and make a sharp U-turn at each end. I can't remember how



The front gearbox uses a gear diff, but the ball diff from the rear will fit it. You can see that these gears are built to last, too.

many cars I've flipped on those U-turns, but this Tamiya just won't flip over!

You may already know that Tamiya offers several 4WD kits and that those kits share many parts. The Mercedes, however, uses Tamiya's most advanced TA02 chassis; and its stock suspension works very well on asphalt. It suffers a little body roll under hard cornering, but that's easily corrected with heavier shock oil and a wider



The mid-mounted motor is well protected and improves the car's already good balance. With the rear gearbox cover removed, you can see the high-quality gears; they should last a long time.

spring spacer (included with the kit). If you trade in the slicks for off-road tires, the car should perform quite well on dirt, and the 4WD is even more impressive there.

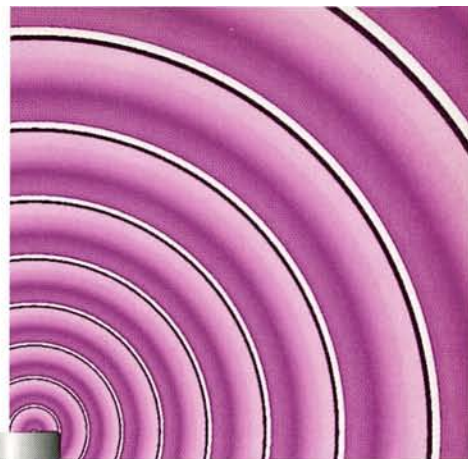
FINAL THOUGHTS

I've never been disappointed with a Tamiya car or truck. Like most of their other products, the Mercedes is aimed at intermediate R/C hobbyists—those who can appreciate a high-quality kit but can't—or won't—spend big bucks. This car will appeal to almost anyone who's interested in R/C. It's fun to build, great to look at and a pleasure to drive. It performs well, but if you want, you can use the factory options to upgrade to an even higher class of performance.

The complexity of the 4WD and plastic gears prevents this from being the fastest car in the world, but its real strength is the way it handles those hairpin turns on your imaginary European country roads—and the way it lets your imagination soar.

*Addresses are listed alphabetically in the Index of Manufacturers on page 168.

AM, FM, PCM



What's the Difference?

IF YOU LOOK at ads and listen to talk in the pits, you might get the impression that there are three distinct types of radio—AM, FM and PCM.

Actually, only AM and FM are types of radio, but PCM coding is talked about so much that people think of it as a separate radio. The truth is that a PCM-coded radio can be either AM or FM.

Pulse-position modulation (PPM) and pulse-coded modulation (PCM) are coding techniques that combine up to eight channels into one radio signal. Amplitude modulation (AM) and frequency modulation (FM) are radio-frequency (RF) modulation techniques that modify the carrier signal (a pure sine wave) so it can carry information through the air and to your car's receiver. R/C radios use PPM or PCM to encode the channel information and AM or FM to modulate the carrier—got it?

ENCODER

This is where the fun begins. It's the encoder's job (see Figure 1) to combine the two signals from the wheel (steering) and the trigger (throttle) into one signal. The encoder in an aircraft radio can combine up to eight channels into one signal! As I mentioned above, the encoder can be PPM or PCM. Since there are far more PPM radios out there, I will start with them.

PPM ENCODING

In a PPM radio, the encoder includes a timer for each channel. The variable resistor in each control is part of that timing circuit. When the wheel is at neutral, the timer goes off at 1½ milliseconds. If you turn the wheel all the way one way, the timer stretches to 2 milliseconds. Turn the

wheel the other way, and the timer drops to 1 millisecond. The timer can vary between 1 and 2 milliseconds and provide extremely fine control.

The encoded signal begins with a start pulse that's 200 microseconds long. (This would be a good time to look at Figure 2.) Following the start pulse is a pause or delay in the signal; then comes another 200-microsecond pulse. A pause that is as long as the channel-2 timer comes next; then another 200-microsecond pulse. This continues until the timers for all channels are covered, and then there is a long synchronizing pause. The synchronizing pause lets the receiver know that it has all the channels and allows you to mix transmitters and receivers with different numbers of channels (sometimes).

Everything in the encoder repeats over and over at what is called the "frame rate." Manufacturers use frame rates that operate from 50 to 70 times a second. At 50 times a second, the frame length is 20 milliseconds. The servo position can be adjusted once per frame, so on a PPM system, the servo can be adjusted 50 times a second. Are your reflexes that fast?

PCM ENCODING

PCM encoders are much more complex than PPM encoders, and they're still relatively new. A PCM encoder is so complex, in fact, that it requires a microcomputer to implement it. Each manufacturer uses a slightly different scheme, but the principles are similar. The controls still have the variable resistors, but instead of being part of a timing circuit, the value of the resistance is usually converted into a voltage that's read directly by the microcomputer.

The microcomputer combines all chan-

Pulse-position modulation (PPM) and pulse-coded modulation (PCM) are coding techniques that combine up to eight channels into one radio signal. Amplitude modulation (AM) and frequency modulation (FM) are radio-frequency (RF) modulation techniques that modify the carrier signal (a pure sine wave) so it can carry information through the air and to your car's receiver. R/C radios use PPM or PCM to encode the channel information and AM or FM to modulate the carrier.

by Stan Van Druff

AM, FM, PCM

nel inputs into one signal. Some systems add an extra bit of information called a “checksum” that helps the receiver to find errors. While a PPM encoder signal can move the servo an infinite number of steps, the PCM encoder can only control the servo in a fixed number of steps (1024 steps, or 512 steps in older designs). This coarser resolution is insignificant to most drivers, but it makes it possible for the receiver to know exactly what the transmitter sent it. Reliability is further improved by requiring the transmitter to send the same message three times in a row.

By the way, there’s a pervasive rumor that PCM transmitters interfere with PPM receivers on adjacent channels. This is hogwash. The FCC limits all transmitters (AM, FM, PPM, or PCM) to 750 milliwatts power and 20 kilohertz bandwidth. If a PCM transmitter does interfere with a PPM receiver, it’s because the receiver is of poor quality, or it’s not working properly.

I said that PCM encoders are complex enough to require a microcomputer, but such encoders by no means stretch a microcomputer to its limit. The same microcomputer can drive a fancy liquid-crystal display (LCD), remember multiple settings and even stoop so low as to act like a PPM encoder! That’s right; most PCM radios have a switch that allows them to act like PPM radios and talk to ordinary PPM receivers. Isn’t technology wonderful?

MODULATOR

I didn’t really want to bring this up, but I can see where the terms modulator and modulation can cause confusion. After all, PCM, PPM, AM and FM are all types of modulation, right? Technically speaking, yes. PCM and PPM have the added distinction of being able to encode several channels (multiplex) into one. This is why I talk about PCM and PPM encoding and AM and FM modulation.

Whether it is a PCM or a PPM radio, manufacturers long ago figured that all their encoders should put out the same voltage so they could use the same RF circuitry (it’s cheaper that way). So, either a PCM or a PPM radio can use AM or FM modulation and can work on any assigned frequency.

The modulator performs two related functions: it converts the encoded signal into a form that is less susceptible to interference from other signals; and it converts the encoded signal to radio frequency so that it can be transmitted to the car without huge amplifiers and mile-long antennas.

RF modulation works by varying (modu-

Figure 1

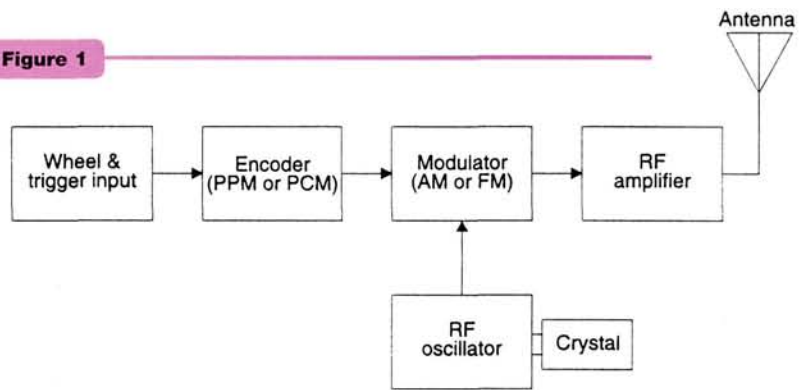


Figure 2

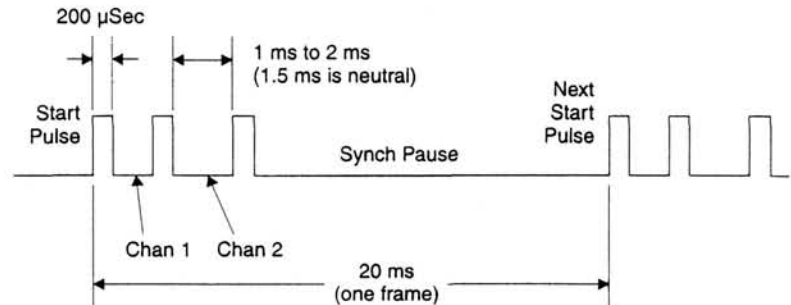
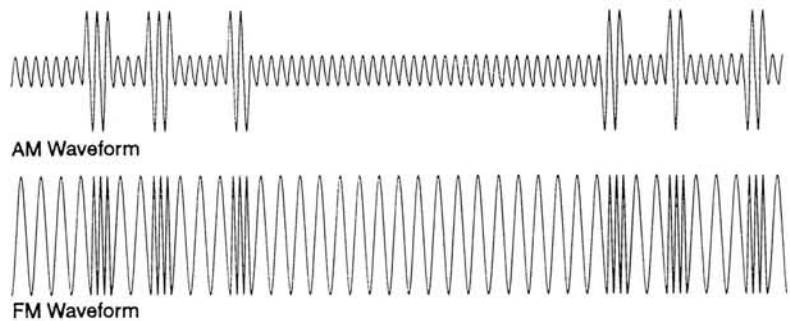


Figure 3



lating) a carrier signal. The carrier is a pure sine wave that is the frequency marked on your crystal. By itself, the carrier doesn’t give any useful information, e.g., turn left or half throttle, to your receiver. All the information is in the modulation. Think of how you would signal a friend with a flashlight. If you just turn on the light, the only information your friend gets is that your batteries are OK. By flashing the light in some agreed-upon manner, though, you can let him know whether the British are coming by sea or by land. Flashing the light on and off is a simple form of modulation called “on/off keying.” On/off keying isn’t used in R/C, but two other types of RF modulation are pretty common. As if you didn’t know already, they are amplitude modulation (AM) and frequency modulation (FM).

AMPLITUDE MODULATION

As its name implies, AM modulates the amplitude of an RF signal (Figure 3). Suppose your trusty flashlight had a knob on the side that would allow you to adjust its brightness (amplitude). Instead of turning the light on and off, you switch it from bright to dim. If your friend has good eyes, he will be able to decode your signal almost as easily as with on/off keying. As it turns out, this is very easy to do with radio waves. If you were not worried about FCC requirements, you could build an AM modulator with a single transistor! All that other stuff in a store-bought model is for filtering and increasing power.

Because they’re less expensive, AM radios are by far the most popular. Nearly all ready-to-run sets include AM radios, and

HOW TO CHOOSE A TRANSMITTER

If you aren't really interested in the technical details, this sidebar will help you to choose your gear intelligently and with a minimum of fuss. Here are some of the things you should always think about when considering R/C electronics:

- How serious are you about R/C?
- How much are you willing to spend?
- Are you planning to compete in R/C?
- Will you always run electric cars, or would you like to try gas?

Keeping the above in mind, you should also find out about a transmitter's performance, comfort and features before you buy it.



COMFORT

It's surprising how different transmitters can feel. Some are made for small hands; others are for large hands. Some have batteries in the base that give them a solid bottom-heavy feel, and others have batteries in the handle for a completely different balance. Joysticks are ideal for flying but, for driving a car, almost everyone in the U.S. wants a radio with a wheel.

Make sure you can reach the trigger comfortably. If you have small hands, you may have trouble working the brake (you apply the brake by pushing the trigger away from you). The wheel should be comfortable in your other hand; it shouldn't slip or require too much force to turn (some models have adjustable spring tension). If you're a southpaw, you'll have to learn to steer with your right hand, or consider one of the few reversible models. If you're going to compete, the comfort of the transmitter is an important part of how your car "feels."

FEATURES

Features are those little things that are nice to have and allow you to customize the transmitter to your liking. Some of the features you'll see are: servo-reversing, battery-level meter, steering dual rate, servo trim and servo-volume adjustments. A battery-level meter or indicator is a must, and it's almost impossible to get any car to run straight without having adjustable steering trim on the transmitter.

Servo-reversing is really handy and almost a necessity if you use the transmitter with more than one car. (It seems that half of all cars need the servos to turn in the opposite direction, and if your transmitter has reversing switches, all you have to do is flip one.) Adjustable travel volume, dual-rate and exponential rate adjustments allow you to control how the servos move for a given input from the wheel or trigger. They're nice if you race different cars or run your car on different tracks. If you run cars with very different characteristics, high-end transmitters allow you to store settings for several cars and to choose among them with a push of a button.

FREQUENCY

You also have to pick a frequency for your radio. R/C car drivers in the U.S. can choose between the 27MHz and 75MHz bands. The 27MHz band shares the airwaves with R/C aircraft. It's less susceptible to noise from electric motors, but it's the most susceptible to the illegal high-powered CB rigs that vex some parts of the country. Some believe that 27MHz is the best choice for 1/4-scale cars because all the metal parts in a 1/4-scale car can cause electrical interference. Just remember that 27MHz is limited to six channels.

The popular 75MHz band is for the exclusive use of R/C cars and boats. Try to choose a frequency that others in your area don't use. Otherwise, pick one near the middle of the band. That way, when you change crystals, you'll never change frequency by more than half the band. If you plan to race, keep in mind that, as of this writing, none of the race-sanctioning bodies permits odd-numbered channels in official races.

The FCC controls what R/C transmitters can put out, so the signal from one AM radio is pretty much like that from any other AM radio. The same is true for FM models. The FCC doesn't regulate receivers, and that's where you're likely to find a difference in performance. Most transmitters come bundled with a receiver, so make sure that the transmitter you choose also comes with a suitable receiver.

PERFORMANCE

To me, performance means that the radio itself won't break or quit working unexpectedly, and the tenuous RF link between you and your car won't break or quit working unexpectedly. Most manufacturers build lasting products, so it's rare for a radio system to die suddenly. It's much more prone to intermittent failure, interference, or glitching.

A pulse-coded modulation (PCM) radio is actually a computerized AM or FM radio with built-in error-checking and fail-safe features. By design, a PCM radio is the most immune to interference and glitching, although a few racers complain that they "feel slower" than FM. AM radios are the most susceptible to interference, and FM radios fall somewhere in-between. If you're going to run a gas car, you'll probably want the increased reliability of an FM or a PCM system. AM radios are the least expensive (therefore the most popular), and that's where you'll find the widest selection. FM is the choice if you want a little better performance in a noisy environment but you don't want to spend the money for a PCM radio.

many people never use anything else. But AM radio is inherently susceptible to interference. If you listen to AM broadcast radio, you know that the signal comes and goes with weather and that passing cars, electric motors and even fluorescent lights can cause interference.

Another problem with AM is that receivers are not frequency selective. The signal is carried on the amplitude of the wave, and the receiver will demodulate whatever frequency it gets. AM radios are still useful because most R/C tracks are removed from the highways and industrial complexes that are the main sources of interference. At least one manufacturer makes an AM PCM radio that has built-in error checking and fail-safes that make it more immune to interference.

The bottom line is that AM radio is fine unless you plan to run someplace where interference is a common problem. If that is the case, you might want to look at an FM system.

FREQUENCY MODULATION

Let's take the flashlight analogy one last step. Suppose you had a control that could change the color of the flashlight from red to green. By flashing combinations of red and green light, you could send secrets to your friend. When you change the color of light, you're actually changing its frequency. Switching between two frequencies like this is called "frequency shift keying" (FSK), and it's exactly how an R/C FM transmitter works. FM ignores amplitude and focuses solely on frequency. It does not matter if you use bright green and dim red; it is the frequency (color) that counts.

FM transmitters are much more complex than AM transmitters, so they cost a lot more. FM also generates many unwanted signals called "sidebands." AM has only two sidebands, and they're easy to filter out (to meet FCC bandwidth rules). FM transmitters require rigorous filtering to stay within the allotted 20kHz bandwidth.

Since FM receivers don't care about the amplitude of the signal, FM works over longer distances without degradation, and interfering signals that fall outside the receiver's bandwidth are completely ignored. The bad news is that when the receiver loses the signal, it loses it completely and takes longer than AM to recapture it.

So, now you know the difference. Read the sidebar to help you decide which one is right for you. ■

STREET RACING

Trinity

RACING HAS ALWAYS been an integral part of our hobby. Racers and manufacturers spend countless hours on research and development trying to turn faster laps, improve existing equipment and come up with even faster, more efficient products. When it's time to produce the best equipment, however, cost considerations often take a back seat, and most racers find themselves on the short end of the stick, spending a ton of cash to keep up with technology.

Recently, there has been an effort by a few manufacturers to curb the high cost of racing by introducing low-cost, parking-lot racing series that revolves around inexpensive equipment. The most recent entry into this fold is Trinity's* new Street Spec series. Although it follows the same principles as the other series—intense racing action at a low cost—the Street Spec series differs from the others currently available. Let's take a closer look.

THE PRICE IS RIGHT

The idea is: keep the racing competitive, but keep the cost down. Trinity follows the same philosophy as major race-sanctioning organizations for full-size vehicles—CART, NASCAR and Trans-Am; they tightly structure and enforce rules to keep the racing as even as possible. By limiting chassis design, motors, batteries, body selection, tires and overall cost, Trinity has developed a "Spec-class" type racing series that has easy-to-enforce rules (in other words—no more cheating).

The most important limitation is cost. To participate in this series, a car chassis and body must retail for \$165 or less. All manufacturers are invited to produce their own cars and participate in this series. A chassis

rac

Affordable Racing





Street Spec Racing is Back

by John Howell

PHOTOS BY WALTER SIGAS



with body, motor and battery must retail for \$199 or less; there are no exceptions to either rule.

By putting a limit on cost, Trinity ensures that the racing doesn't become "high-end" and discourage potential newcomers to the hobby. Keeping costs down also prevents racers from using high-end technology. Racers won't feel as though they have to have every go-fast goodie to keep up with or get ahead of the rest of the pack. The emphasis in the Street Spec series is on the driving and setup of the car, not on the actual equipment.

STREET SPEC RACING

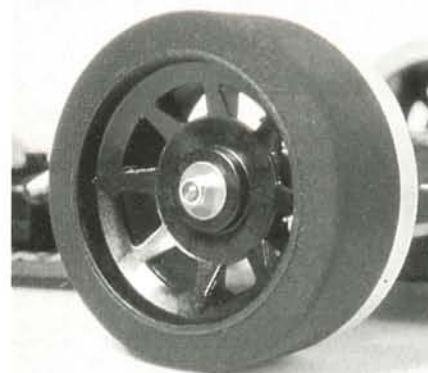
THE CAR BEHIND THE SERIES

Even though cost is controlled, performance isn't directly proportional to price—at least, not in the case of Trinity's S-Spec 10 car. Three low-cost versions are currently available: a touring sedan (SS2230), a Nastruck (SS2240) and a NASCAR stock car (SS2222). Both the truck and the stock car use the same chassis design; but the touring car uses a shorter, narrow, track chassis.

The NASCAR stock car should prove to be more popular because it's fashioned after one of the most popular, if not *the* most

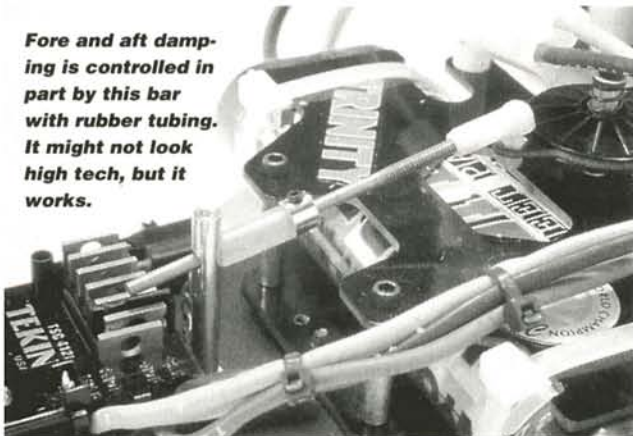
popular, form of full-size automotive racing in the U.S. It's based on a pan-car design and features a G-10 black-fiberglass chassis and both front and rear suspensions. The front suspension consists of a floating kingpin/coil spring-style setup, while a rear pod with a fore-and-aft damper unit and lateral-pod damping system control the rear end. The car is equipped with bushings throughout, except for a pair of ball bearings for the rear axle.

The NASCAR's fiberglass chassis accepts either a 4- or a 6-cell Street Spec battery pack in side-to-side fashion. Also included are Spec foam tires that have a distinguishing gray band around them. The foam tires are mounted on NASCAR-style, black-composite wheels and are pre-tuned. The front tires are currently available in three compounds: orange, green and blue. The rear tires are available in both green and blue com-



Perfect for all types of racing, Street Spec tires feature a great low price.

Fore and aft damping is controlled in part by this bar with rubber tubing. It might not look high tech, but it works.



pound. The most important feature of the tires is their low price of \$9.99 a pair; most racing foams retail in the vicinity of \$20.

All three kit versions come with a Spec motor and battery combo. The Street Spec motor is a 21-turn stock motor with 12 degrees of timing and a locked commutator. It can also be bought separately at a low retail price of \$22.99. Compared with a typical stock motor's retail price of \$32, the Street Spec motor is a bargain.

To ensure that racers play by the rules, Trinity plans to release a Spec brush that's easy to identify—something race organizers can incorporate in their series for easy

15 MINUTES TO BLAST OFF

NEW



The AC/DC Mega Charger. It gets you where you want to be. FAST.

Powerful enough to charge most batteries in 15 minutes or less, the Mega Charger has mega features to boot. Voltmeter jack. Discharge circuit. Extra-large meter. And heavy-duty components to last a long time. In fact, the only thing that's not mega is the price.



tech inspection. The brushes have 2-tone shunt wires.

All three types of car use Trinity's EX-Spec cell, which was developed through a joint effort with Sanyo. To eliminate cheating, the cell comes with its own unique Spec logo on the shrink-wrap. Also, the pack's outer plastic shrink-wrap and sticker will tear if you try to remove them, and it's clear, so tech inspectors can see the cells.

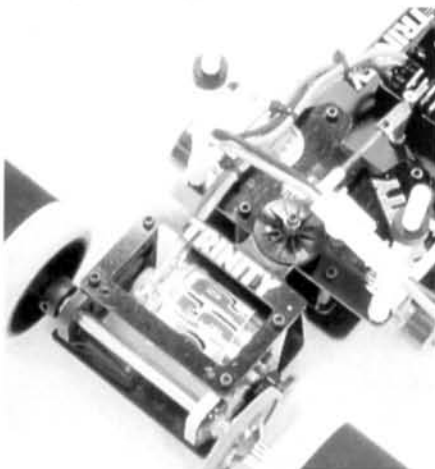
Trinity sent us a NASCAR Street Spec kit to test. It included the battery and motor, so we put it through a test that resembled racing conditions. Here are our impressions of the car.

GETTING ON THE ROAD

Assembly is straightforward, but the instructions can use a little work. If you've built a pan car before, you'll have no problem; but if this is your first kit, you might want to get some assistance from a more seasoned R/C enthusiast. Some photos would have helped.

Fine-tuning and proper car setup are crucial to run your car at its best. Pay particular attention when building the front and rear suspension systems. Make sure the front kingpins slide smoothly through the steering blocks. If they bind at all, remove them from the blocks and polish them. To increase damping, use some silicone lube or diff lube on the kingpins. The stock kits don't use caster on the front kingpins, but you can add some with washers or Associated's caster shims. Also, make sure that the differential assembly doesn't bind.

You can use different tire combinations and toe-in/out settings to set your car up to perform in different ways for various track conditions. With more toe-in, the car's steering is less aggressive in the corners,



The S-Spec 10 features a rear pod with damper, just like conventional pan cars.

The Series in Motion

Because Trinity's Street Spec series is so new, we decided to contact a track that's getting involved with it to see how things are going. We contacted "Scooter" at Scooter's Hobby Hut in Niles, OH, and asked him a few quick questions.

RCCA: Give us your feelings on how Trinity's Street Spec series will affect the hobby?

Scooter: It will have an enormous effect! This series, with support from the factory as well as hobby shops, will really bring fun back to the racing scene.

RCCA: How has the response been, so far?

Scooter: The Trinity Spec class has been the most exciting to watch and participate in. It has brought more fun per night than any other type of racing.

RCCA: What's the usual turnout for your Street Spec races?

Scooter: Since we received our first shipment of S-Spec cars, we've sold 28. Of those, 20 are raced every week.

RCCA: What is it about the series that made you want to participate?

Scooter: Well, the S-Spec is a good, high-quality car that has a low retail cost. It also gives you the ability to compete right away. With a

little bit of money for a kit, and a little bit of practice, you could race in an A-Main.

RCCA: In what direction do you see it going in the future?

Scooter: As long as the manufacturers keep it as a Spec class, I can see this form of racing growing and growing. This class is excellent for the beginner as well as the seasoned racer. But, if the aftermarket people try to bring in hop-ups, then I think that it will be doomed. From what I understand, though, Trinity is going to keep a very watchful eye on what will be legal and what won't be. As a side note, my racers tell me that if it weren't for this class, they wouldn't be racing, because of the cost. It has brought back fun and camaraderie to a hobby that, in my opinion, had lost its way.



At last, evenly matched racing.

and its handling is more neutral. Dialing in more toe-out does just the opposite.

Running a softer compound tire up front yields better steering response, because harder tires make the car push. For racers who need that extra edge, tire-traction compounds, such as Trinity's Zip Grip, are allowed in Street Spec racing.

In Street Spec racing, car tuning is limited to tires, front springs and front and rear damping. This makes it easy for anyone to be competitive. Running softer springs gives steering gains similar to those achieved by running softer tires; you get more steering response, which is good for short, tight, twisty tracks. If you run stiffer springs, the car will be more stable at higher speeds, and that's beneficial on high-speed, longer tracks.

Because all cars are equipped equally going into a Street Spec race, these setup tips may help your car to gain an advantage by running more smoothly.

TRACK TIME

We took our completed car to a local parking lot for a quick spin. We weren't really expecting to break any speed records, but we were pleasantly surprised with its driving capabilities and decent speeds. In fact, handling is similar to that of full-blown racing-style pan cars. The kit's 0-degree-caster front end makes the car turn and handle in an ultra-responsive way. It's nice to know that in Street Spec racing, you'll race against your buddies on an even level.

Overall, we were all impressed with the vehicle's handling, especially considering its very low retail price. So, if you and a few of your buddies are interested in starting your own race club, check out Trinity's Street Spec series and S-Spec 10 car; it's a great way to get some pretty intense racing action going without spending a ton of cash.

*Addresses are listed alphabetically in the Index of Manufacturers on page 168.

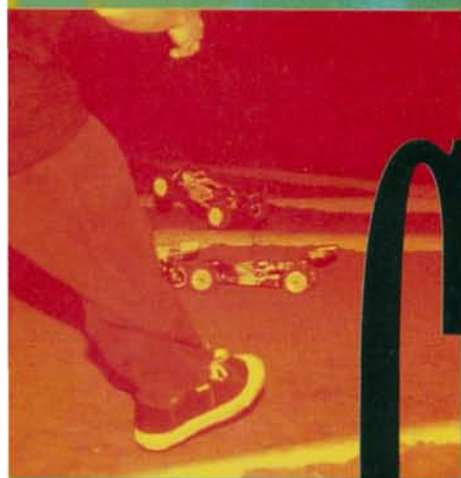
The 10th Annual

REEDY

INTERNATIONAL



Race of



by George
Gonzalez

Champion

sponsored by *Novak Electronics*
and *Radio Control Car Action*

PHOTOS BY GEORGE GONZALEZ

Champion CELEBRATION



Team Losi's Greg Hodapp (first row, center) spanked everyone in the Invitational class and earned the overall title of being "the man to beat." Greg scored five first-place finishes out of six races in 2WD and won four races out of six in 4WD.

THE REEDY INTERNATIONAL Race of Champions is considered one of the most prestigious, non-sanctioned, off-road racing events in the world; it's also one big party. The first Reedy Race was actually a birthday party for Mike Reedy, owner of Reedy Modifieds. Many top racers decided to celebrate Mike's birthday with a spectacular off-road racing event held in his honor. To treat Mike to some super-hot, off-road racing action, they cut the qualifying heats and raced in a six-main point match.

This year, the Reedy Race celebrated its 10th anniversary along with Mike's birthday, so it was the biggest celebration yet. Racers traveled from all parts of the U.S., Europe and Japan to participate in the celebration and to stake their claim to one of the most coveted titles in R/C. The event was held from January 20 through 22, 1995, in Corona, CA, and was hosted by M&M Hobbies. Novak Electronics* and R/C Car Action Magazine sponsored the event.

RACING CLASSES

There are three classes of racing at the Reedy Race—2WD Open, 4WD Open and the Invitational class.

The 2WD and 4WD classes are open to all drivers, and are run according to ROAR rules. Four rounds of qualifying are scheduled, and each race is won in a single, decisive A-Main. The winners of the 2WD and 4WD classes are asked to race in the Invitational class at the next Reedy Race.

REEDY RACE

Drivers earn the right to compete in the Invitational class by performing well in national or world-class events. The invited drivers face six consecutive Mains in 2WD and six consecutive Mains in 4WD without any qualifying heats. All the Mains are shuffled, and the drivers each receive a pamphlet that names their competitors in each Main. Points are awarded according to their finishing position and the driver with the lowest score is declared the winner, e.g., a first place finish is worth 1 point, a second place finish is worth 2 points, and so on.

Barry Baker (near right) TQ'ed 4WD Open and went on to win the A-Main. Jimmy Jacobson (far right) TQ'ed in 2WD Open and also went on to win the A-Main. Both have been invited to participate in next year's Invitational class.



Combination of Wins in 2WD and 4WD Invitational

Fin	Pts.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	11	Greg Hodapp	Losi/Yokomo	Maxtech	Stealth	Tekin	Airtronics	Jammin/Yokomo	Losi
2	14	Brian Kinwald	Losi/Yokomo	Trinity	Trinity	Novak	Airtronics	Losi/Yokomo	Losi
3	16	Mark Pavidis	Assoc/Yokomo	Reedy	Reedy	Novak	Airtronics	Mirage/Yokomo	Losi/Pro-Line
4	19	Masami Hirosaka	Yokomo	Reedy	Yokomo	Tekin	KO Esprit II	Mirage/YZ-10	Losi/Pro-Line
5	22	Derek Furutani	RC10/Yokomo	Maxtec	World Class	Tekin	Sanwa	Mirage/Yokomo	Pro-Line
6	23	Mark Francis	RC10/Yokomo	Reedy	Reedy	Novak	Airtronics	Mirage	Pro-Line
7	25	Scott Brown	Losi	Twister	Orion	Novak	JR R-756	Jammin	Losi
8	25	Craig Drescher	Assoc/Schumacher	Reedy	Keil	Novak	KO Propo	Mirage/Stock	Pro-Line
9	28	Rick Hohwart	Assoc/Yokomo	Peak	Orion	Novak	—	Assoc	Pro-Line
10	30	Matt Francis	RC10/Yokomo	Reedy	Reedy	Novak	Airtronics	Mirage	Pro-Line



2WD Open

Fin	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Jimmy Jacobson	RC10	Reedy	Reedy	Novak	Airtronics	Mirage	Pro-Line
2	3	Steve Chamberlain	RC10	Peak	Orion	Novak	Airtronics	Mirage	Pro-Line
3	7	Jay Robinette	Losi Double-X	Extreme	World Class	Novak	Airtronics	Jammin	Losi
4	9	Scott Roberts	RC10	Reedy	Orion	Novak	CS-2P	Mirage	Losi/Pro-Line
5	10	Chris Raceles	RC10	Reedy	Reedy	Novak	Airtronics	Mirage	Pro-Line
6	4	Sohrab Tavakoli	Losi Double-X	Peak	Orion	Novak	Airtronics	Jammin	Losi
7	5	Brian Robinette	Losi Double-X	Kinwald	Stealth	Novak	CS-2P	Jammin	Losi
8	6	Gary Guest	RC10	Peak	Orion	Novak	Airtronics	Mirage	Losi/Pro-Line
9	8	Deryl Feinner	Losi Double-X	Maxtec	Orion	Novak	Airtronics	Jammin	Losi
10	2	Barry Baker	Losi Double-X	Maxtec	Stealth	Novak	Airtronics	Jammin	Losi

4WD Open

Fin	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Barry Baker	Yokomo	Maxtec	Stealth	Novak	Airtronics	Yokomo	Losi
2	2	Brent Wallace	Schumacher	Maxtec	Stealth	Novak	Futaba	Schumacher	Pro-Line
3	5	Paul Wynn	Yokomo	Reedy	Reedy	Tekin	Airtronics	Yokomo	Pro-Line
4	3	Aaron Biner	Yokomo	Peak	Orion	Novak	KO EX-1	Yokomo	Losi
5	7	Robert Gillespie	Yokomo	Warlock	Race Edge	Novak	Airtronics	Race Edge	Pro-Line
6	8	Patrick McCarson	Schumacher	Precision	Badd Boyz	Tekin	Airtronics	Schumacher	Pro-Line
7	9	Jason Moberly	Yokomo	Peak	Motor Man	Tekin	Caliber	Yokomo	Pro-Line
8	10	Jeff Whitman	Schumacher	Matrix	Dbl. Strike	Tekin	Airtronics	Schumacher	Pro-Line
9	4	Jon Leonard	Yokomo	Reedy	Lenspeed	Tekin	JR Apex	Yokomo	Pro-Line
10	6	Sohrab Tavakoli	Yokomo	Peak	Orion	Novak	Airtronics	Yokomo	Losi

OPEN A-MAIN ACTION

2WD Open

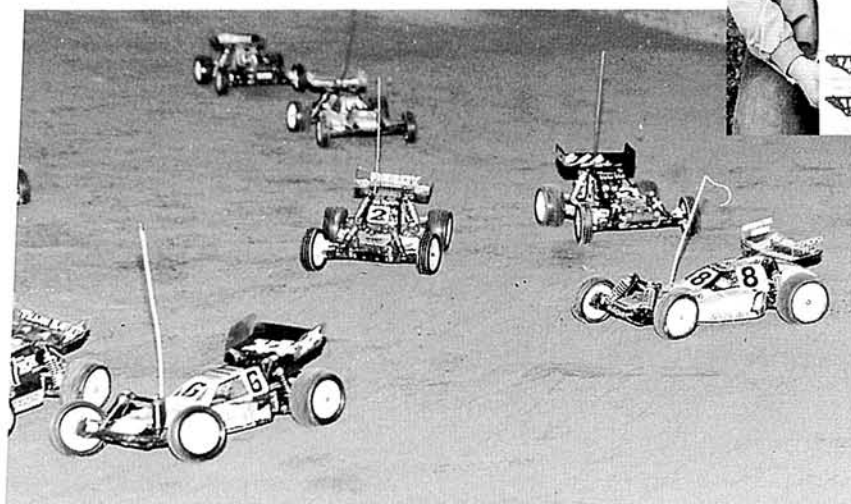
Jimmy Jacobson earned the TQ honors after battling with Barry Baker, Steve Chamberlain and Sohrab Tavakoli for four grueling rounds of qualifying. In the A-Main, Jacobson got the

ACTION TALK New Softer Compounds

Some drivers used Pro-Line's* new XTR-M2 compound, which is softer and stickier than the original XTR compound, and provides tons of traction on slippery tracks.

Some Team Losi drivers also tested a new Silver compound which is softer than the Gold compound and provides traction on slick, hard-packed surfaces. The Silver compound will be available in all the popular Losi tire tread patterns. Some of the Losi drivers also ran the new Micro Dash tires in both their 2WD and 4WD cars. Greg Hodapp used the new Micro Dash tires in both of his cars to win the championship.

early lead and closed the door on his competition. Baker's car broke down on the first lap, and that left Chamberlain and Jay Robinette to battle it out for second and third. After the dust had settled, Jacobson was found to be the only driver who had squeezed in an extra lap, and



this earned him a first-place finish with a 12/4:17.53. Chamberlain finished second with a 11/4:04.10, and Robinette placed third with a 11/4:04.33. Jimmy Jacobson will be asked to race in the Invitational class at next year's Reedy Race.

• 4WD Open

During the qualifying heats, Barry Baker's Maxtec* motor-equipped YZ-10 was over 7 seconds faster than his closest competitor and this earned him the TQ honors. In the A-Main, however, the competition was tighter because

(continued on page 92)



Derek Furutani and Matt Francis or Team Associated were seen associating with this young woman. Could her influence have helped them both place in the A-Main?

Craig Drescher and his father came from England to compete. Craig had a pretty good weekend on American soil; he placed eighth overall in the Invitational class.

Daryl Lane of A&L Mfg. was on hand to display his company's trick graphite aftermarket shock towers and battery holders.



At the end of the event, Kira Schieffer ably presented the glittering trophies to the overjoyed winners.

Masami Hirosaka and his father made the trek from Japan to compete. Masami placed a creditable fourth overall in Invitational.



Team Losi's Brian Kinwald had to settle for second overall in the Invitational class.



Jack Johnson (left) and Gil Losi Jr. watch some intense track action unfold before them.



Maxtec's Joe Maloney, shown here with his girlfriend Carmen Istrate, provided the major motor horsepower in Greg Hodapp's and Barry Baker's winning cars. Word is that Greg and Barry rub Joe's goatee for good luck before they race; guess it works!



REEDY RACE

(continued from page 89)

Brent Wallace challenged Baker the entire way. Paul Wynn and Aaron Biner also trailed behind dangerously close. Baker and Wallace traded positions so often that it was hard to predict the outcome, but Wallace clearly set the pace.

With less than 10 seconds left in the race, Baker rear-ended Wallace's car in one of the corners, and Wallace lost control long enough for Baker to squeeze by and take the win. The crowd booed Baker's unsportsman-like move, but that's racing. Baker took the first-place trophy and Wallace settled for the second-place trophy. Wynn ran an exceptionally clean race and took the third-place trophy. Baker will be invited to race in the Invitational class at next year's Reedy Race.

INVITATIONAL RACE OF CHAMPIONS

• 2WD Invitational

Greg Hodapp proved himself a true world-class contender by totally sweeping the 2WD Invitational class under the carpet. He took five firsts and one second for a total of 5 points—the lowest possible score because one race is thrown out and used only in the event of a tie. Brian Kinwald ranked second

in this class with one third-, three second-, and two first-place finishes for a total of 8 points. Mark Pavidis' 9-point final score ranked him third.

• 4WD Invitational

Greg Hodapp's winning streak carried over to the 4WD Invitational class with four firsts and two seconds for a total of 6 points. Hodapp was tied with Brian Kinwald, who also earned 6 points with one fourth-, one second-, and four first-place finishes. Mark Pavidis again placed third with a total of 7 points.

Points from the 2WD and 4WD Invitational classes were tallied, and Team Losi and Maxtec driver Greg Hodapp, with a total of 11 points, was declared the champion of the Reedy International Race of Champions. Driving for Trinity and Team Losi, Brian Kinwald took second place with a total of 14 points; and with 16 points, Team Associated/Reedy driver Mark Pavidis took third.

Maxtec Sweeps the Reedy Race

Until recently, Maxtec motors were a diehard racer's best kept secret. The word is now out that Maxtec motors are hot and so some big trophies are being snatched up all over the country. Many pro drivers have switched to Maxtec motors, including Team Losi drivers Greg Hodapp, Jeremy Kortz and Barry Baker, as well as Associated drivers Derek Furutani and Brent Wallace. Greg Hodapp swept both the 2WD and 4WD Invitational classes with his Maxtec-equipped cars, while Barry Baker TO'd and won the 4WD Open class with his Maxtec-equipped YZ-10. Congratulations Maxtec!

The Reedy International Race of Champions was a great success. Top drivers from all over the world extended birthday regards to an industry leader, Mike Reedy, and went toe-to-toe against some of their greatest adversaries. The folks at M&M Hobbies deserve commendation, as usual, for running an exceptionally clean race, and congratulations are in order for Greg Hodapp, Barry Baker, Jimmy Jacobson and the folks at Maxtec motors, for their excellent performances at the event.

* Addresses are listed alphabetically in the Index of Manufacturers on page 168.

The SK-5 hovercraft was extensively used in Vietnam for patrol and interdiction missions in the Mekong Delta. This model duplicates the amphibious versatility of the combat craft: it can travel over water, land, ice or snow with ease. It is an exciting experience to fly and maneuver.

Scale	= 1/24	Length	= 24"
Width	= 14 1/2"	Weight	= 2.8 lbs
Cushion pressure	= 5 lbs/ft ²		

Kit includes all body parts, seals, hardware and 2 electric motors. Required equipment: 2 channel RC with reversible speed control and batteries.

Retail Price = \$164.95



SR-N6 HOVERCRAFT FAST FERRY

The SRN-6 amphibious hovercraft is used in many different roles. Originally, it was configured as a high speed passenger ferry in Europe and in the U.S. It has the capability to travel at speed over shallows, swamps or ice, and then land to discharge or take on passengers.

Scale	= 1/24	Length	= 29"
Width	= 14 1/2"	Weight	= 3.2 lbs
Cushion pressure	= 5 lbs/ft ²		

Kit includes all body parts, seals, hardware and 2 electric motors. Required equipment: 2 channel RC with reversible speed control and batteries.

Retail Price = \$193.95

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HOW TO

Select Shock Pistons

by JACK JOHNSON

Piston Packin'
POUNDERS

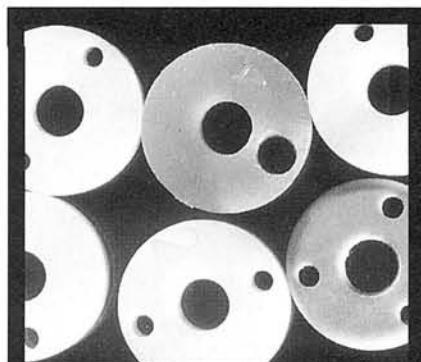
SUSPENSION IS THE MAIN FOCUS of today's sophisticated off-road car setups. At the heart of any suspension system are the shock absorbers, or dampers, as they're sometimes called. There are countless ways to adjust the shocks; the springs, the oil and the pistons can be changed independently or all at once.

To help racers choose the right springs and oil, most manufacturers provide detailed information on their labels. Springs are rated by their length and compression rate (in pounds) and oil by its thickness (viscosity). Various types of shock pistons are also available for popular racing cars and trucks. Understanding shock pistons is as important as knowing how to select springs and oil; it's also a little more complicated.

WHAT DIFFERENCE DOES IT MAKE?

If you're not sure how piston valving (the size and number of openings in the piston) affects how a shock works, the following analogy may help clear things up: picture yourself standing shoulder-deep in a swimming pool with your arm positioned in front of you and your hand held horizontally (flat). When you move your arm back and

forth in the water, the position of your hand does not create a lot of resistance. If, however, you were to do the same thing with your hand turned vertically, the resistance would be greatly increased as you move your arm. When your hand is held horizontally, the resistance is similar to that of a piston with larger holes (less piston surface area) and, when your hand is held vertically, the resistance is similar to that of a piston with smaller holes (more piston surface area).



Understanding shock pistons
is as important as knowing
how to select springs and oil...

By setting up the shocks with the right oil and piston combination, the handling of the car or truck can be changed tremendously. You'll find that the shocks can be tuned for any track surface that you encounter, and this can keep you one step ahead of the competition.

KNOW THIS FIRST!

So, where do you start? Let's take a look at the swimming-pool example again. Unlike the viscosity of pool water, the viscosity of the shock fluid can be changed. If the resistance to your horizontally held hand was too little, or if the resistance to your vertically held hand was too great, changing the viscosity of the water would allow you to achieve the desired amount of resistance.

Before we take this any further, there are some other terms that should be discussed. The first is "pack." Pack is the rate at which the shock reacts to any quick, sharp compression. How quickly the oil can pass through the piston is what determines the shock's pack. As a rule, pistons with smaller holes, i.e., more surface area, have more pack than pistons with larger holes, i.e. less surface area. Pack is most notable when a vehicle lands after a big jump or when it's traveling through rhythm sections that have several medium to large jumps or bumps.

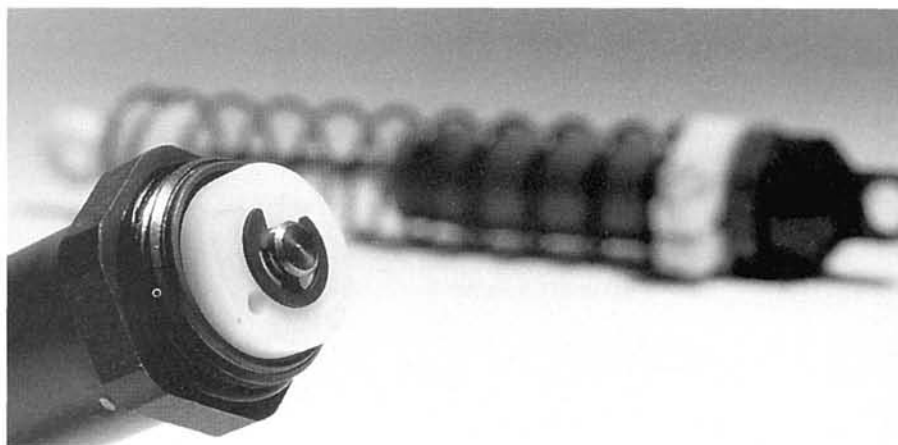
The second term is "static damping." This is the amount of resistance that *you* feel while slowly moving the shock in and out. Static damping generally affects the handling of the car or truck as it enters and exits the corners and as it passes over the small "footprint"-type holes in the track's surface. Static damping can be adjusted by changing the oil, and it's less affected by the piston's valving. Changing to a thicker oil will increase pack. As you've probably figured out by now, achieving the right combination of pack and static damping can be tricky, and that's why the size of the piston's holes is so important.

GIVE ME A PLACE TO START

When you set up the shocks, you must determine what type of surface you'll be running on. If the surface is smooth, start with a piston that has small holes in it. If the surface is rutted and has several bumps in it, use a piston that has larger holes. After the pistons have been installed, select an oil. Unfortunately, there are so many combinations of shocks and so many varieties of cars and trucks available that there's no way I can tell you what oil to use with what shocks. The best thing to do is to follow the suggestions in the instruction manual. I can tell you from experience that when you change your pistons and try to find the ultimate setup, you'll use a lot of shock oil and several rags to change the shocks!

THE BENCH TEST

When the shocks have been assembled and attached to the suspension, clear a spot on a table or a bench. With the front end of the car on the table, drop the rear end of the vehicle from a height of about 6 to 8 inches. The suspension should be compressed slightly past ride height and return to the



desired ride height. If the chassis slaps against the table, the shock doesn't have enough pack. For now, change to a heavier

oil, and try this test again. If the suspension doesn't move much and seems to be too rigid, you have too much pack. To fix this, change to a lighter oil.

When you're happy with the rear suspension, perform the same test with the front suspension. Again, you want the suspension to compress just slightly past ride height and to return to the desired ride height. Adjust the oil in the same manner that was described for the rear suspension. When you're satisfied with the front and rear suspension, drop the entire vehicle from a height of 6 to 8 inches. When viewed from the side, the front and the rear suspension should be compressed at about the same rate. If the rear suspension has more

spring to it and is compressed faster than the front, change to a rear piston with smaller holes. If the front suspension is compressed and returns faster than the rear, change to a front piston with smaller holes.

THE TRACK TEST

Now it's time to try the new settings on the track. If the rear of the car seems to hop when it's driven over small holes and ruts,

the rear shocks have too much pack. To cure this, replace the piston in the rear shock with one that has larger holes in it, and use a heavier oil to achieve the same static damping. If, however, the rear suspension bounces in the ruts because the chassis is bottoming out, or if the vehicle bottoms out hard when landing on big jumps, the rear shocks don't have enough pack. In this case, replace the piston in the rear shock with one that has smaller holes, and use a lighter oil.

The front suspension can be adjusted in a similar way. The pack in the front shocks is adjusted according to how the vehicle jumps. If the vehicle jumps with its nose down, usually, the front shocks don't have enough pack. To fix this, change the front pistons to ones with smaller holes. The oil must be changed to a lighter weight to maintain the static damping and the proper front-to-rear balance. If the vehicle jumps nose up, either the chassis is bottoming out and then springing up because of too little pack, or the suspension arms aren't moving much, and the front end is popping up because there's too much pack in the front suspension. Whichever is the case, increase or decrease the pack as described above, and try it again.

This is a subject about which an entire book can be written. I think that I've covered the basics and given you enough information so you can get out there and experiment on your own. Once you start to make adjustments and try different piston and oil combinations, you'll have a much better understanding of how everything works. Just think of the benefits: you'll be driving past your competition as they bounce around the track! ■





INTERVIEW

Changes and
challenges—
ROAR
welcomes a
new club
president.

by Doug Mertes

THESE ARE challenging times for the Radio Operated Auto Racing (ROAR) organization. For more than 26 years, it has been America's largest R/C car race-sanctioning body. Made up of a diverse group of manufacturers, racers and importers, ROAR organizes an annual series of regional and national championships in almost every major class of R/C car racing. Virtually every employee is a volunteer. ROAR is, essentially, a very large R/C club.

If you've ever been involved with a club of any sort on a local level, you know that such volunteer organizations have recurring problems—typically, either financial or administrative. ROAR is no different. Its financial health and membership level ebb and flow according to the skill of the administrative and marketing staff. Because ROAR officers serve for only two years, there's a periodic change in management, record keeping, marketing, rule-making and organizational efforts.

ROAR's newest president is Bob Novak (a name that's familiar to anyone who races R/C cars). Novak-brand electronic speed controls (ESCs) hold 16 world championships. R/C electronics is the company's only business. Their clean and airy headquarters in Irvine, CA, is populated by employees who live and breathe R/C, including a staff of three mechanical and three electrical engineers. From designing and making the prototypes to manufacturing, production, testing and repair, Novak does it all. It's obvious that Bob and his employees take a lot of pride and put a lot of effort into making their company one of the best in the field.

I had a chance to visit with

B

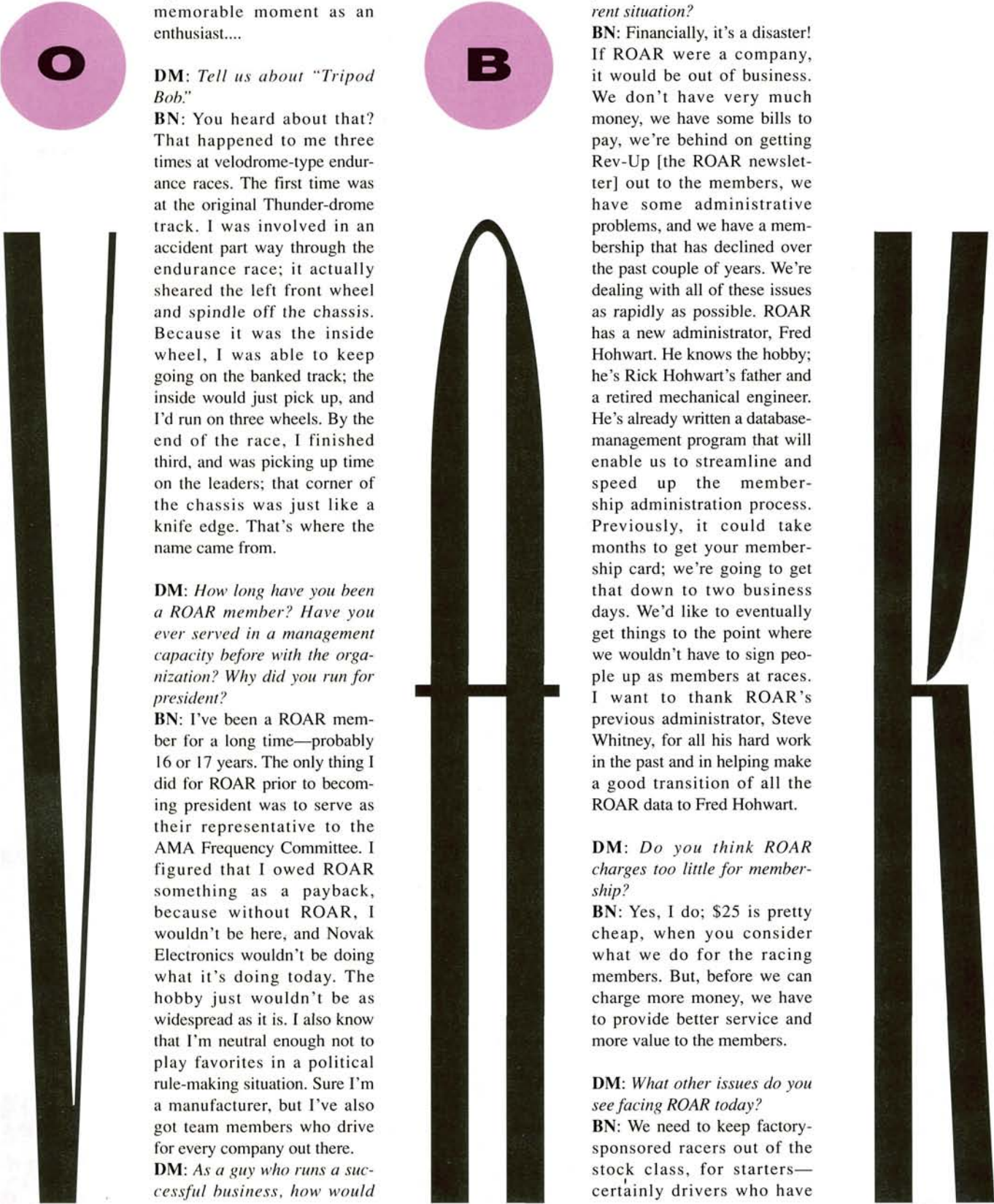
Bob shortly after he took over ROAR's helm (an apt term, because Bob is an avid boater and diver, and he also mountain bikes and skis—on snow and water). We talked about ROAR's current status and about the organization's future.

DM: *Bob, how long have you been interested in R/C, and how did you wind up on the manufacturing end?*

BN: I've been building airplanes since I was four years old: static models, control line, stuff like that. I built my first R/C airplane back in 1956, with electronic components that were built from scratch—you know, tube transmitters and receivers. That was when I decided what I was going to do with my life: I wanted to get an engineering degree and work in the R/C industry. I went to college to get an education in electrical engineering, switched to aeronautical engineering and then went back to the EE side, graduating from Iowa State University. R/C airplanes are really my first love. I've flown and competed in pattern, quarter midget and Formula One pylon-racing airplanes. One of our newest products is an ESC called the "Arrow" for electric airplanes.

DM: *The building's lobby, halls and offices are full of trophies and plaques from races around the world. What have been some of your most memorable moments in R/C, as an enthusiast and as a manufacturer?*

BN: I think my most memorable moment as a manufacturer would have to be when I received a medal in 1985 from my peers in the R/C industry. It was the Howard McEntee award, as Radio Control Person of the Year. That's pretty pres-



tigious. As for the most memorable moment as an enthusiast....

DM: Tell us about "Tripod Bob."

BN: You heard about that? That happened to me three times at velodrome-type endurance races. The first time was at the original Thunder-drome track. I was involved in an accident part way through the endurance race; it actually sheared the left front wheel and spindle off the chassis. Because it was the inside wheel, I was able to keep going on the banked track; the inside would just pick up, and I'd run on three wheels. By the end of the race, I finished third, and was picking up time on the leaders; that corner of the chassis was just like a knife edge. That's where the name came from.

DM: How long have you been a ROAR member? Have you ever served in a management capacity before with the organization? Why did you run for president?

BN: I've been a ROAR member for a long time—probably 16 or 17 years. The only thing I did for ROAR prior to becoming president was to serve as their representative to the AMA Frequency Committee. I figured that I owed ROAR something as a payback, because without ROAR, I wouldn't be here, and Novak Electronics wouldn't be doing what it's doing today. The hobby just wouldn't be as widespread as it is. I also know that I'm neutral enough not to play favorites in a political rule-making situation. Sure I'm a manufacturer, but I've also got team members who drive for every company out there.

DM: As a guy who runs a successful business, how would

you characterize ROAR's current situation?

BN: Financially, it's a disaster! If ROAR were a company, it would be out of business. We don't have very much money, we have some bills to pay, we're behind on getting Rev-Up [the ROAR newsletter] out to the members, we have some administrative problems, and we have a membership that has declined over the past couple of years. We're dealing with all of these issues as rapidly as possible. ROAR has a new administrator, Fred Hohwart. He knows the hobby; he's Rick Hohwart's father and a retired mechanical engineer. He's already written a database-management program that will enable us to streamline and speed up the membership administration process. Previously, it could take months to get your membership card; we're going to get that down to two business days. We'd like to eventually get things to the point where we wouldn't have to sign people up as members at races. I want to thank ROAR's previous administrator, Steve Whitney, for all his hard work in the past and in helping make a good transition of all the ROAR data to Fred Hohwart.

DM: Do you think ROAR charges too little for membership?

BN: Yes, I do; \$25 is pretty cheap, when you consider what we do for the racing members. But, before we can charge more money, we have to provide better service and more value to the members.

DM: What other issues do you see facing ROAR today?

BN: We need to keep factory-sponsored racers out of the stock class, for starters—certainly drivers who have

major sponsorship. The stock-class racers support the hobby to a great extent, and we shouldn't discourage them from competing in regional or national events because they can't get the equipment that a factory-sponsored driver can. We have a class for that kind of racing; it's called modified. Novak doesn't directly sponsor any stock-class drivers at all. I also think we should stop announcing sponsorship for stock-class racers in the higher Mains at major events. What kind of message are we sending to the guy who used vacation time to come to a big race and only made it into a lower Main? Are we telling him that he just can't compete without sponsorship?

I also think we need to do a better job of regulating things like off- and on-road tires, batteries and motors. The average racer just can't get the same parts as the sponsored guys. These things take time to work out, because we all want to do things the right way, without anybody getting hurt from a marketing standpoint; but they've got to be done for the good of the hobby.

DM: What's in the near future for ROAR? What changes can we expect to see?

BN: We need to address entry-level racing, whether it's parking-lot or spec racing, or Legends, or Trinity's new S-Spec class rules. That's a growing segment of the hobby—kind of ironic, because that's where ROAR started so many years ago—in the parking lot. I've already heard stories about the cost to the racer getting out of hand in some parts of the country. We need to encourage newcomers to the sport, and if we give them the impression that you have to spend big bucks to compete on any but the most basic level, very few of them will come back.

ROAR also has to offer a membership value to the non-racer. Other sanctioning organizations—like NHRA—offer non-racing associate memberships that are very popular. I'm not ready to talk about the details on this yet, but it's something we've got to do. Racers make up less than 10 percent of the R/C population, so it's the other 90 percent who keep the industry in business. It doesn't make a lot of sense to me to shut those people out of ROAR because they don't race.

DM: If you could say one thing to current or potential ROAR members, what would it be?

BN: Join up! Let's get ROAR back to its former glory days! We promise to get you your membership cards as soon as possible. Continue to volunteer, renew your membership, and bring more of your fellow racers into the organization. Part of your membership dues support our role in IFMAR—the organization that's still the only way to get to a world championship. This is no longer a political organization, and we want and need your comments, your ideas and your support.

DM: How could an interested person contact ROAR to join?

BN: For information about ROAR membership, contact Fred Hohwart, 30872 Coast Hwy., Ste. 111, Laguna Beach, CA 92677; (714) 494-0515; fax (714) 494-3413.

DM: Thanks, Bob, and good luck with ROAR!

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WITH RON AILER AND HOBBY BOBBY

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RON, YOUR PROBLEM IS FRICTION.

WHAT DO YOU MEAN, FRICTION? I'VE GOT FULL BALL BEARINGS!

BUT RON, BEARINGS ARE ONLY AS GOOD AS YOUR BEARING LUBRICANT. HAVE YOU TRIED SNAKE OIL?

SNAKE OIL?

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POWERGLIDE
WITH
SP-10



LATER...

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OH, UH, THE RIGHT BEARINGS I GUESS!



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**NEW
PRODUCT
WATCH!**

ONE OF THE BEST THINGS about off-road cars and trucks is their versatility. They can be driven over virtually any surface—dirt, mud, sticks, gravel. They also perform quite well on paved surfaces. Unfortunately, off-road tires don't always work well on the road, and foam on-road tires, which may be awesome on clean asphalt, lose their grip if run over the slightest amount of dirt and sand.

PRO-LINE HAWGS

Takin' it to the

by Frank Masi

The Road Hawg tires from Pro-Line* bridge this gap between on- and off-road performance. They're designed to provide on-road grip comparable to that of foam on-road tires and superior to that of conventional off-road tires. More important to those who run their cars on the street, Road Hawgs can pass over sandy areas without losing their composure. This article looks at transforming your dirt machine into a road-gripping street performer with Pro-Line's Road Hawg and new Dirt Hawg tires.



Designed to be used on all types of surfaces, Dirt Hawgs resemble tires used on full-size desert-racing trucks. For added traction in off-highway situations, their tread is deeper than that of the Road Hawgs.

ROAD HAWGS

Unlike foam tires, Road Hawgs are semi-pneumatic, which means that they're hollow and filled with air (at the same pressure as the surrounding atmosphere) like off-road tires. To enhance cornering ability, Road Hawgs use a low-profile sidewall, similar to a high-performance tire on a

off-road front tires, they'll only fit Pro-Line's wide RC10 front wheels (part no. 2557 for flanged front wheel bearings, no. 2559 for unflanged bearings such as RC10 three-piece or older Losi cars). You can also convert your 1/10-scale pan car to accept Road Hawgs by using the RC10 wide front wheels and RC10L rear wheels (no. 2567). Road Hawg IIs fit any front or rear, 2.2-inch-diameter truck wheels.

The mounting procedure for Road Hawgs is the same as that for off-road tires. A continuous bead of thin CA run between the tire and rim will ensure that the tire stays put and sidewall flex is minimized. Foam inserts should

be used with all soft-rubber tires to prevent tread distortion and, because the foam supports the tire's form, the tire material can be thinner, hence lighter. All of the XTR and XTR-M2 Road Hawgs come with foam inserts. After the tire has been glued to the rim, you should make one or two small ventilation holes in the tire to allow air to escape and be drawn in when necessary.

Another benefit of the Road Hawg's rubber compound is extended tire life. Because of the rubber's adhesive quality, traction remains consistent until the tread is nearly worn off. If you really wanted to push it, you could run the worn tires as slicks until they disintegrate; the rubber itself would provide adequate traction!

Road Hawgs turn your buggy or monster truck into a screaming street machine. Their scale-looking tread allows dirt and sand to be ejected without loss of traction.



DIRT HAWGS

These are the newest addition to the Hawg tire series. Designed to fit any 2.2-inch-diameter racing truck wheel, Dirt Hawgs are somewhat similar to Road

Hawgs, but they feature a deeper, more aggressive tread that's more suitable for off-pavement use. These all-terrain tires

The Road Hawg tires bridge this gap between on- and off-road performance.

are patterned after those of full-scale desert racing trucks and will provide good bite on almost any surface including low grass, dirt, mud, sand and pavement. Like Road Hawgs, Dirt Hawgs are molded in XTR-M2 rubber for maximum stickiness, and they come with foam inserts. Mount the Dirt Hawgs on your rims just as you mount the Road Hawgs.

Dirt Hawgs feature a taller sidewall (similar to an off-road tire) that enables them to provide additional shock absorption when the going gets rough. On the road, the Dirt Hawgs don't grip quite as well as Road Hawgs, but they do produce a neat "howling" sound, and their sidewalls roll under during cornering—just like the real thing. These are probably the closest thing to an all-purpose tire that you can buy for your racing truck. In fact, unless you race seriously, you'll probably never need to swap Dirt

Hawgs for other types of tires regardless of the conditions.

For additional road performance, consider adding travel-limiting spacers to your car or truck's shocks. The resulting lower ride height will enhance cornering and stability. In addition to the tires described, Pro-Line also makes Road Hawg-type tires for parking-lot racing sedans and Formula 1 cars (Sedan Hawgs and F1 Hawgs). Look for more on these tires in upcoming issues.

* Addresses are listed alphabetically in the Index of Manufacturers on page 168.

Streets

full-size car. A wider sidewall is necessary for off-road tires because it helps to absorb bumps and jolts, but a low profile lessens tire "roll-over," where cornering forces cause the treaded area to tuck under the wheel. Besides giving the tire an appealing scale look reminiscent of a Formula 1 rain tire, the Road Hawg's aggressive tread pattern improves traction on sandy pavement by shedding small particles and stones from beneath the tire, much as a full-size tire sheds water. The edges of the treads increase sideways traction to improve grip during cornering.

Pro-Line tire engineer Tim Clark applied his knowledge of off-road tire design to the Road Hawgs. For instance, the type of rubber compound used to make a tire can drastically affect performance. For traction on hard-packed off-road tracks, the rubber's adhesive property is as important as the design of an off-road tire's spikes. Similarly, soft, sticky rubber provides phenomenal traction on paved surfaces. Road Hawgs are molded out of Pro-Line's new XTR-M2 rubber compound, which is even softer and more adhesive than their XTR.

There are three versions of the Road Hawg to fit most off-road buggies and trucks. To convert a buggy to full on-road status, you'll need a pair of Road Hawg version I rear buggy tires (part no. 1061), which fit any 2-inch-diameter rear buggy wheel. You'll also need a pair of version IIIs (no. 1063) up front, but because they're substantially wider than conventional



PARMA/PSE THOR DYNO

by Doug Mertes



Hammer the Competition

GO TO ANY local track on a typical Friday or Saturday night, and you'll hear them from time to time. Head for a regional or national race, and you'll find them continuously whining and whirring in the pits, sounding like some species of exotic electronic insect. What I'm referring to is a device that's known more correctly as a "motor dyno," because it tests the rpm, amp draw and power levels of a motor when it's spinning freely or under a simulated load. Even when controlled by a computer or regulated by sophisticated voltage-control devices, motor dynos, at best, give racers only limited useful information. You can make a motor that's fast on the dyno but is a dog on the track. Most people do that shortly after they get their first dyno, before they've learned how to read the results properly. What only a few dynos can tell you is how to gear a particular motor to ensure optimum performance for your particular racing situation. Gearing decisions can certainly be based on dyno readings, but to do so accurately takes time and experience.

I first ran across the Thor dyno at the 1994 Oval Winter Championships. Its inventor, Greg Greene, was an interesting character who obviously knew his equipment and how to use it. He raced pretty well, but more impressive was the gearing information that he was able to give to other racers. At least one of those guys picked up an entire lap and went up two Mains in the bargain! Greg had the seed of a good idea in the dyno that I saw that day, but it had to be made more user-friendly before it could be sold to the public.

Apparently, that's where Parma/PSE* stepped in, because the unit tested here is more polished and is ready for average racers to buy and use. The case, switches, plugs, electronics and related hardware are all well-finished. Although some areas could be improved, this unit will soon become a necessity for competitive racers.

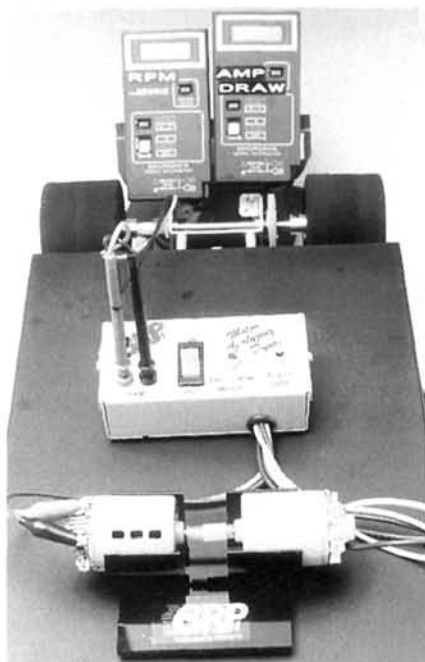
Don't get me wrong; this isn't a new motor dyno to replace the one you currently use or are contemplating buying. This chassis dyno yields vital test information on the rpm and amp draw of a particular motor, brush and spring combination—geared and in the car. You'll still have to use your motor dyno to work on brush and spring combos to increase rpm once you've set the gearing. Even Greg Greene uses a Competition Electronics* Turbo Dyno 45 to work on his motor when it's out of the car; but once you've learned how to use the Thor properly, you'll be able to set and save your handout motors for qualifying and use another motor for practice. Your motor will be fresh for the first qualifier, while everyone else's has been run a couple of times to determine gearing.

HOWZIT WORK?

The Thor dyno consists of a 35A power supply (you can use the power leads to break in brushes, or run a commutator [comm] lathe), varied motor loads, a pan-car rear-pod assembly that's bolted onto the

back panel, and switches and plugs that control the unit and allow you to access output values on a pair of digital voltmeters (DVM). You'll need to mount a pair of new rear foam tires on the pod assembly (tire diameter is important, and the proper size is given in the instructions) and provide your own DVMs to obtain readings from the unit. It's nice that the dyno comes with its own power supply, but I wondered why the DVMs and tires weren't included. The PSE people told me that racers probably have them already, and that including them with the dyno would have driven the price beyond what they felt was acceptable (\$379.95 retail).

To operate the dyno, plug in the power, and place your car (with motor and pinion gear installed) on top of the unit's case, with its rear tires resting on top of the dyno's tires. Rear-pod width is adjustable to accommodate 1/10- and 1/12-scale and F1 cars as well as the widest trucks. Attach the power leads directly to the motor using the supplied alligator clips, and hold the car down so that it doesn't fly away when you apply voltage. Make sure that all the load switches are in the "off" position and that the DVMs are turned on and set to DC-voltage readings. Turn the power switch on so that the motor will start up and will rotate the dyno's tires. Voltage from the dyno's slave motor is then fed to the DVMs, and that produces readings of both



The 35A power supply is great for breaking in brushes or running a comm lathe.

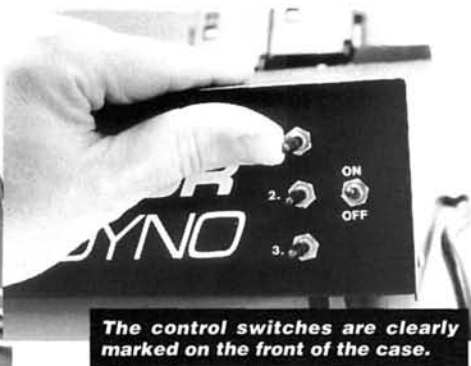
Mark two small digital voltmeters for rpm and amp draw. You'll find that it's easier to record your progress that way.

tire speed and amp draw. Write these readings on the chart that's included with the dyno's instructions, and then increase the load on the motor by sequentially flipping the three load switches on the front of the dyno's case. Write the readings at each level, then turn the unit off. It's complicated at first, and it almost seems as though you need a couple of extra hands to run a test, but it gets easier with practice.

IT WORKS!

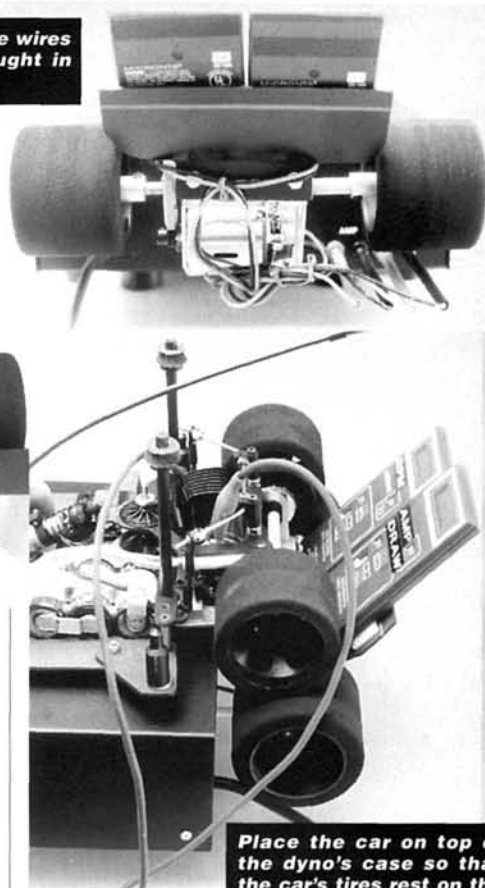
A little ingenuity can help you to adapt the dyno to your own particular needs. A simple L-bracket fence that's servo-taped to the front case panel would hold the car on the top of the case. A thick foam pad glued to the top of the case would elevate the chassis on 4WD and off-road buggies and trucks and make it easier to test them. A Velcro®-brand fastener could hold the car down, and that would leave your hands free to write down the test results.

The Thor dyno can also be used to test your speed control's efficiency. Simply run one test with the power leads attached directly to the motor, then run a second test with the power leads attached to the ESC



The control switches are clearly marked on the front of the case.

Neatly bundle and tie-wrap the wires so that nothing can get caught in the revolving gears and tires.



Place the car on top of the dyno's case so that the car's tires rest on the dyno's tires. Hook up the motor, and let 'er rip!

input leads, and turn on your transmitter. Have a friend pull the throttle all the way back to full, and run another test sequence. Compare the readings with those obtained during the first dyno run. If they aren't very, very close, check the ESC potentiometers and radio trims to make sure the ESC is turned all the way up at full throttle.

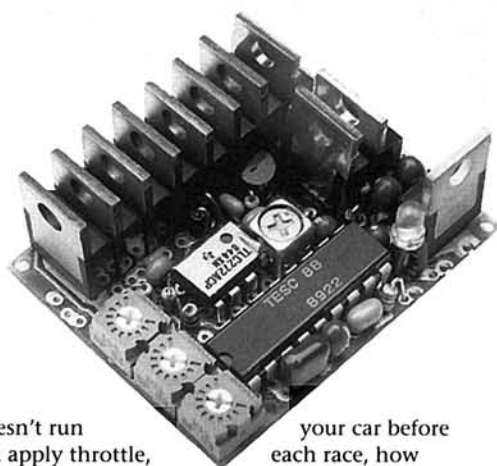
To verify my findings, I dyno'd several motor/gearing combinations on the workbench and then went to the track to see whether I was headed in the right direction. The gearing I had worked out on the dyno turned out to be spot on at the track. So that I'd have a good practice motor, I set up a mild modified motor to produce the same numbers as a hot stock. My track times with that motor were identical to the times I ran with my best stock motor! I dyno'd a couple of other racers' cars, too, and all the fast cars showed dyno numbers that were very close to one another. This thing works!

I commend Greg Greene and the folks at Parma/PSE. This solid, well-made unit provides true value for above-average racers. The instructions are well-written and explain all the procedures in detail; and they even provide a couple of phone numbers to call if you just can't figure something out—good stuff!

**Addresses are listed alphabetically in the Index of Manufacturers on page 168.*

TECH HEAD

by Stan VanDruff



More About Speed Controls

Top: thanks to SMT (surface mount technology), a ton of components can be jammed onto a circuit board that's a little larger than a square inch. **Center:** racing-style ESCs usually come with some sort of torque-control system and have a three-wire setup for motor and battery connection. **Bottom:** most manufacturers offer ESCs with reverse, such as this 610-HRV.

The evolution of the electronic speed control (ESC) is probably the biggest advance made in R/C car technology in the past 10 years. The efficiency, durability and precise throttle control offered by today's generation of ESCs allow the racer to take full advantage of the high-capacity batteries and super-hot motors that are available. This month's column contains information on speed-control hookup and explains some of the features found on high-performance ESCs.

ESC HOOKUP

■ **Connectors.** High-end ESCs are a little more difficult to install than most R/C electronics, because most racers solder their ESC leads directly to the motor and the battery. (This setup, when done correctly, provides the lowest resistance.) If you

use connectors, however, be sure they're of high quality and can handle 20 amps or more. Also, look for connectors that are keyed so you can't accidentally hook them up backward or confuse the motor connector with the one for the battery.

■ **Radio noise.** The combination of motor and ESC can create radio interference. Soldering the proper capacitors onto the motor will go a long way toward eliminating this problem, but there are some extra precautions you can take. Wires connect the motor to the ESC; if the motor generates any noise, the noise will travel through these wires. Depending on how your system is wired, radio noise can also travel through the battery wires. You should mount your ESC as close to the motor and as far from your receiver as you can get it. Use short wires and be especially careful to keep the antenna away from the ESC, the motor and the battery.

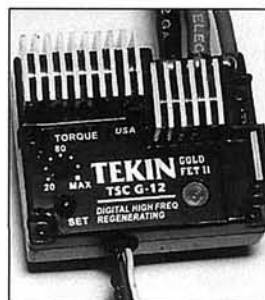
■ **Transmitter adjustments.** Once you've mounted the ESC, it has to be set up to work with your transmitter. Usually, you set the transmitter's throttle trim to neutral, then trim the ESC to neutral. If the

motor doesn't run when you apply throttle, but does run when you apply the brakes, throw the servo-reversing switch on the transmitter. Finally, you adjust the ESC to come on full throttle just before the transmitter trigger reaches full throttle. More and more microcomputer-controlled ESCs on the

your car before each race, how many times have you hooked them up backward? The ESC also gets pounded every time the car goes over bumps and jumps.

Speed controls aren't cheap, but manufacturers build them better than most military gear. Reverse-voltage protection is standard, because it's too easy (and too common) to hook a battery up backward. For example, most Tekin* ESCs use a solder-drop fuse to protect the controller. If you hook up a battery backward, the fuse will blow instead of the expensive FETs. Some Novak models have solid-state RVP (Reverse Voltage Protection), so if you put the battery in wrong, the motor just runs in reverse.

ESC designers also go out of their way to protect your investment by including protection against overheating. One approach used by manufacturers is a temperature-sensing diode on the drive-transistor bank; if the drive-transistor bank gets too hot, the controller will be shut down. Using low-resistance FETs also reduces overheating.



market are designed to make setup easy. Instead of using a screwdriver to adjust the controller, just push a button, and the onboard computer does it for you.

How you set the brakes depends on your driving style. Once the ESC has been set up, you can make adjustments with the EPA low-point adjustment setting on the transmitter.

PROTECTION

It's easy to take ESCs for granted, but they're subject to awesome stresses. Remember that when your motor gets hot enough to fry an egg, all that current went through the ESC. If you solder your batteries into

BATTERY-ELIMINATOR CIRCUITRY

Battery eliminator circuitry (BEC) is another excellent reason to choose an ESC instead of a mechanical



controller. A BEC is nothing more than a voltage regulator, but it lets you eliminate four AA receiver batteries in your car. Compared with the motor, receivers and servos don't draw much current, so running them off the main battery has little effect on run time, but the weight savings is significant.

You have to be careful about using a BEC on dragsters or trucks that use more than 6 or 7 cells. The circuitry in the BEC can't take the full voltage that the ESC can. With more than 10 cells, you can pretty much forget it; between 8 and 10 cells, you have to check the owner's manual.

[Editor's note: manufacturers offer



More and more ESC manufacturers are using a simplified one-touch setup system for their controllers. Just push the button and go!

ESCs designed for use with more than 10 cells; check with your hobby shop on their availability.] Also, keep in mind that BEC current is limited. Many offer 0.5 to 1 amp, although some newer ESCs offer 1.5 to 3 amps. If you use high-power FET servos, make sure that the BEC can provide enough current.

Got a topic that you'd like to see covered in this column? Write to Tech Head, c/o R/C Car Action, 251 Danbury Rd., Wilton, CT 06897, or e-mail frankm@airage.com. Title your message "Tech Head."

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From the track to the parking lot.
This is the R/C action as **YOU** see it.

by Chris Chianelli

Grassroots

RACING

This is YOUR PAGE—YOURS!! It belongs to you, the optimistic local racer on a budget who's looking for some evenly matched action; the individual who's in it for the fun of it all: the grassroots racer—whether on-road or off-road. We at Car Action really do want to see your tracks, your cars and your local heroes—men, women, boys and girls (we love cats and dogs, too!). Show us your local racing scene! Send photos with captions to "Grassroots Racing," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035.



NMRCC fall
OVal Classic race.

by Doug Rollo

survivor; he took the lead and held on for the win. The local racer turned in a 23-lap count in

THE AIR was cool and damp, and the clouds were gray. But, despite it all, drivers began to arrive early at the Northern Michigan Radio Control Car Raceway in the small town of Gaylord. Competitors came from near and far to do battle on the huge, banked, clay, oval track.

The smooth-as-glass, hard-packed surface looked promising for some real top-end speeds. The 4½-foot-high banked curves made the imagination run that much more wild. The 97 racers received their handout Trinity Slot Machine II motors with Stage Three brushes installed. They tweaked and tuned their vehicles for the maximum performance that this monster of a

track would allow.

In the heat races for the Stock Truck class, Walter Henderson, Frank Honson, Keith Sequin, Tim Sibley and Ivan Taylor were the top five qualifiers. For the Stock Gearbox class, Walter Henderson, Doug Rollo, Wes Sawchuk, Frank Honson and Keith Sequin took the top five TQ positions. Ivan Taylor was the TQ for Gas Truck.

During a short intermission, tension built up as everyone prepared to go at it one more time for the trophies. The crowds merged trackside as the Stock Truck Mains started. Close races in all the classes were common. Will Eger won the G-Main, Matt DePew won the F-Main, and Greg McClellan was victorious in

the E-Main. The D-Main winner was Todd Harding, and Andy Hart lapped the field to win the C-Main. Wayne Johnson came from behind to win the B class, and in the A class, top qualifier Walter Henderson never looked back after the sound of the horn and won with 22 laps in 4:03.84. Keith Sequin, who "trailed" in all the way in from Hamilton, Ontario, Canada, finished less than a second behind Walter to place second. Virgil Honson came away with the third-place spot.

In the A-Main Stock Gearbox class, there was a good mixture of Canadians and Michiganders. The race started with a melee in turn 1. Walter Henderson was the big

4:00.84—a new track record. Keith Sequin, doing double duty by racing both cars and trucks, finished second, only one lap down. Wes Sawchuk timed in at 4:02.09 for third, making his long haul from Toronto worthwhile. Frank Honson finished fourth, also with 22 laps. Doug Rollo was





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the second TQ and ended his day in fifth place with 22 laps in 4:04.12. Ivan Taylor, "Mr. TO" won the Gas Truck class with a 23-lap count in 4:04.37; Jason Oviatt was second with 22 laps.

The racers worked like team racers. It was common to see advanced drivers helping entry-level racers and the "haves" sharing parts with the "have-nots." The young went shoulder to shoulder with the old in the pits and

even on the drivers' stand. From beginning to end, drivers shared a Sunday in the spirit of competition and enjoyment.

Trophies were handed out to all the first- through third-place finishers. In my opinion, everyone walked away a winner! The day's biggest winner was Bonnie Wingo. She tearfully accepted the trophy that's presented to individuals who display outstanding sportsmanship, service to the

club and promotional support to R/C racing.

As the sounds of laughter and excitement subsided and the last few people pulled away from the track, we all sensed that this sport is really more than just racing. It's learning to win and to lose—and to do it graciously. It's meeting new people and sharing a common interest. Track time lasted only 16 minutes; the fun lasted all weekend.



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If you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here's a few hot-line phone numbers that you can use if you have any questions, or if you'd like to start a program in your area.

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ARIZONA

Arizona Indoor Off-Road, 21 41 S. Industrial Park Ave., Tempe, AZ 85282; Jerry Walter, (602) 966-8166



Finish Line Raceway, 7025 E. 21st St., Tucson, AZ 85710; Jerry Kikkert, (602) 747-3633



Frank's Hobby House, 19401 N. Cave Creek Rd., Phoenix, AZ 85024; Marty, (602) 992-3495



G&S Raceway, 967 Hancock, Bullhead City, AZ 86442; Bob Olsen, (602) 758-1100



Havasut R/C Raceway, 1400 S. Smoketree (Rotary Park), Lake Havasu, AZ 86403; Bernie Coates, (602) 855-2966 or (602) 855-4666



HobbyTown Raceway, 9180 E. Indian Bend Rd., Scottsdale, AZ 85250; Dennis, (602) 948-3946



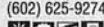
HobbyTown Raceway, 1915 East Baseline Rd., Gilbert, AZ 95234; Kenny, (602) 892-0405



Hobbytown Raceway, 2814 W. Bell Rd., Phoenix, AZ 85023; Mike Kaminski, (602) 993-0122



Quarter Flash's Squirtin' Dirt Raceway, 16301 S. Santa Rita #C, Sahuarita, AZ 85629; Dave or Randy, (602) 625-9274



R/C Sports Mania, 3550 N. 35th Ave., Phoenix, AZ 85017; Brian Dick, (602) 278-3671



Speedway Hobbies, 1000 N. Humphreys St., #204, Flagstaff, AZ 86001; Gary McAllister, (602) 556-0710



ARKANSAS

Arkansas Int'l. Superspeedway, P.O. Box 1636, Pine Bluff, AR 71613; Joe Pitts, (501) 247-2371



Performance Hobbies, 2222 Spence, Jonesboro, AR 72401; Rick Winingham, (501) 935-3501



Tri State R/C, 415 N. 4th, Fort Smith, AR 72901; Robbie Langely, (501) 783-4038 or (501) 452-7783



CALIFORNIA

Cats West/Hawk's R/C Raceway, 1201 West 10th St., Antioch, CA 94509; Jerry Winkelbaver, (510) 779-1665



City Speedway, 7750 Convooy Ct., San Diego, CA 92111; (619) 560-9633



Cloverdale R/C Raceway, 1 Citrus Fair Dr., Cloverdale, CA 95425; Tom Kelley, (707) 586-9789; track, (707) 894-4468



Fast Lane, 25845 San Fernando Rd., #21, Laugus, CA 91350; (805) 255-2404



Frogtown R/C Raceway, Motherlode Hobbies, 3069 Hwy. 49, Angels Camp, CA 95222; (209) 736-4989



Greater Los Angeles R/C Racing Club, California State University, Parking Lot A, Los Angeles, CA 90045; Glenn Williams, (213) 734-7888 or Tom Wong, (310) 821-5472



Hobbies Emporium, 1324 Vendels Cir., #111, Paso Robles, CA 93446; Rick Powers, (805) 239-0408



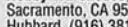
Hobby Haven Raceway, 3983 First St., Livermore, CA 94550; Tom Welding Jr., (510) 443-5828



Hobby Tech, 7932 Miramar Rd., San Diego, CA 92126; Henry Moller, (619) 586-1701



Hobby Warehouse, 5500 So. Watt, Sacramento, CA 95828; Roger Hubbard, (916) 381-7587



Jake's Performance Hobbies, 6650 Commerce Blvd. #21, Rohnert Park, CA 94928; Jake, (707) 586-3375



JC High Desert Raceway, Gorgonio Rd., Phelan, CA 92329; JC Fletcher, (619) 868-4834



JD Hobbies, 1009 W. College Ave., Santa Rosa, CA 95401; Mike, (707) 571-1700



K&M R/C Raceway, 22474 A Barton Rd., Grand Terrace, CA 92324; Mike Blake, (714) 783-0899



KW Raceway, 5630 Ager Rd., Montague, CA 96064; Keith Wilson, (916) 459-3787



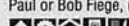
Lodi's Radio Control Speedway, 1033 Black Diamond, Ste. B, Lodi, CA 95240; Mike Belanger, (209) 334-5681



Perris Recreation R/C Track, 120 N. Perris Blvd., Perris, CA 92370; (909) 943-6603



R/C Off-Road Raceway, 10810 Talbert Ave., Fountain Valley, CA 92708; Jeff Paul or Bob Fiege, (714) 965-9615



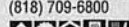
R/C Racing Center and Hobbies, 9842 Channel Rd., Lakeside, CA 92040 (San Diego County); Russ or Cindy Escalera, (619) 443-2270



R/C Sports, 759 E. Monte Vista Ave., Vacaville, CA 95688; (707) 446-5555



Race Prep Raceway, 20115 Nordhoff, Chatsworth, CA 91311; Steve Dunn, (818) 709-6800



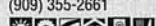
RAMS, Murco Plaza, Paseo Padre Pkwy. & Mowry East, Fremont, CA; Mike Alton, (510) 490-8734



RCRC Hobbies, 2069 Pacific Coast Hwy., Lomita, CA 90717; Rhea & Cliff Fisher, (310) 530-7272



Rickey Racers, 14568 Arrow Hwy., Fontana, CA 92335; Steve Davenport, (909) 355-2661



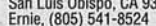
San Francisco Radio Controlled Model Car Club, 3136A Turk St., San Francisco, CA 94118; Randy Swan, (415) 221-1978



So. Cal R/C Raceway, 11930 Valley View St., Garden Grove, CA 92645; Jim Blauvelt, (714) 892-0088



SLO Hobbies, 1356 Madonna Rd., San Luis Obispo, CA 93405; Jim or Ernie, (805) 541-8524



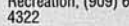
SRS Raceway, 915 N. Main St., Salinas, CA 93906; (408) 424-4044



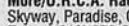
Team Air Racing Club, 18208 Imperial Hwy., Yorba Linda, CA 92686; Don or Nicky, (714) 579-7488



Valley R/C Race Park, 146 S. Santa Fe St., Hemet, CA 92344; Valley Wide Recreation, (909) 654-1505 or 658-4322



Wendy's Country Store and More/O.R.C.A. Racing Club, 5475 Skyway, Paradise, CA 95969; Alan Evans, (916) 872-9363



COLORADO

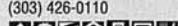
MHOR R/C Raceway, 15540 E. Batavia Dr., Aurora, CO 80011; Jess Brockman, (303) 343-0151



Miracle R/C Speedway, 4206 Wadsworth Blvd., Wheatridge, CO 80034; Rob Brossman, (303) 420-3051



R/C Mini Sports, 6401 Broadway, Unit G, Denver, CO 80223; John Weins, (303) 426-0110



R/C World & Track, 4415 S. Newton St., Denver, CO 80236; (303) 789-0838



S&T R/C Raceway, 323 Auburn Dr., Colorado Springs, CO 80909; Tim Bishop, (719) 574-2910



CONNECTICUT

CT R/C Off-Roaders, behind Old Field School, Fairfield, CT 06430; Mike Belmonte, (203) 661-0145



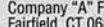
JP's R/C Hobbies, 200 S. Main St., Seymour, CT 06483; Jim Petzold, (203) 888-4849



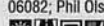
K/N R/C Speedway Inc., West St., Stafford Springs, CT 06076; (203) 684-9896



Little Bristol R/C Speedway, Company "A" Firehouse, New Fairfield, CT 06812; (203) 355-4028



NERCAR, 36 Glendale Rd., Enfield, CT 06082; Phil Olsson, (203) 627-5410



R/C Madness, 640 Enfield St., P.O. Box 64, Enfield, CT 06082; Christopher Marcy, (203) 741-6501



DELAWARE

4E Hobbies, 1138 West Dupont Hwy., Millsboro, DE 19966; Peggy Evans, (302) 934-1708



FLORIDA

B-T R/C Central, 811 Playground Rd., Ft. Walton Beach, FL 32547; (904) 863-1666



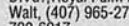
Branford R/C Speedway, Rt. 3, Box 240, Branford, FL 32008; (904) 935-0758



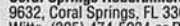
Broward County R/C Race Club, Mills Pond Park, Ft. Lauderdale, FL; Ed Augusto, (305) 525-3304



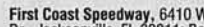
Challenger Speedway at the Willows, Willows Park & Okeechobee Blvd., Royal Palm Beach, FL 33414; Walt, (407) 965-2790 or Mark, (407) 790-6917



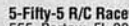
Coral Springs Roadrunners, P.O. Box 9632, Coral Springs, FL 33075; Randy Witte, (305) 474-5934 or Rick Schwartz, (305) 344-1983



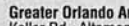
First Coast Speedway, 6410 Waltho Dr., Jacksonville, FL 32211; Bob Thompson, (904) 743-2161



5-Fifty-5 R/C Raceway, State Road 555, Bartow, FL 33830; Chuck Nolke, (813) 324-7406



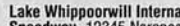
Greater Orlando Auto Racers, 970 Keller Rd., Altamonte Springs, FL 32714; Dave Mottin, (407) 263-4819



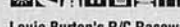
Hobby World Raceway, 7273 103rd St., Jacksonville, FL; Ray or Greg, (904) 772-9022



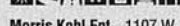
Lake Whipperwill International Speedway, 12345 Narcoossee Rd., Orlando, FL 32827; Bob Hosch, (407) 277-9586; fax (407) 277-2568



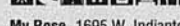
Louie Burton's R/C Raceway, 4215 Mustang Rd., Lakeland, FL 33803; Louie Burton, (813) 665-1322



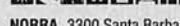
Morris Kohl Ent., 1107 W. Waters Ave., Tampa, FL 33604; Morris Kohl, (813) 931-1626



My Rose, 1695 W. Indiantown Rd., Jupiter, FL 33458; Mark Watson, (407) 744-3800



NORRA, 3300 Santa Barbara Blvd., Naples, FL 33942; Jerry Pecar, (813) 592-7562 or Mark Benfield, (813) 263-6861



Ocala Radio Control Car Club, 3500 SE 30th Terrace, Ocala, FL 34471; Steve Shook, (904) 694-5147



Paul's Stadium Raceway, 4511 W. Dr. M.L. King Jr. Blvd., Tampa, FL 33614; Paul Surette, (813) 872-8662



PBG R/C Motor Park, 6351 Barbara St., Palm Beach Gardens, FL 33410; Doug Gleason, (407) 743-9791



Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615



Red's R/C Raceway & Hobbies, Etc.
1010 Creighton Rd., Pensacola, FL 32504; Linda Till, (904) 479-2330



River City R/C Car Club, 9711 Sharing Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948



Southwest Florida R/C Raceway, 2425 Rivers Rd., Naples, FL 33964; Clyde Armstrong, (813) 455-1143



Tampa Bay R/C Club, P.O. Box 10224, St. Petersburg, FL 33733; Dick Gillette, (813) 526-0744



Three Flags R/C Racetrack, 1755 East S.R. 44, Wildwood, FL 34785; Don Meares Sr., (904) 748-3870; fax (904) 748-5263



Treasure Coast R/C Club, 4931 Oleander, Fort Pierce, FL 34982; Lou, (407) 464-3207



West Coast R/C Club, Lake Park, 17203 N. Dale Mabry, Tampa, FL 33549; Alex, (813) 920-7448; Bert, (813) 654-2554



GEORGIA

Carnesville R/C Speedway, Hwy. 145 S., Carnesville, GA 30521; Bill or Georgia Austin, (706) 335-9044 or 335-3381



Chafee Park Raceway, 1800 Pearl Ave., Augusta, GA 30904; Darren Brooks, (706) 738-8929



Dalton Raceway, 2300 Chattanooaga Rd., Dalton, GA 30720; (404) 226-6699



Echeconnee Superspeedway, 2149 Richardson Dr., Macon, GA 31206; Andy Thompson/Cliff Kline, (912) 788-8731



Lake Mayer Raceway, 1430 Dale Dr., Savannah, GA 31406; Pat Rossiter, (912) 354-0098



PDQ Raceway & Hobbies, 341 Senoia Rd., Peachtree City, GA 30269; Richard Burdett, (404) 631-1788



The Racer's Edge, 1530 Hwy. 19 N., Thomaston, GA 30286; Roger or Mark Walls, (706) 648-2637



KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

Sandy Cross Speedway, Rt. 1, Box 1071, Hwy 51, Royston, GA 30662; Morris Phillips or Wayne Fowler, (706) 245-9573



Silver Wings Raceway, 5611 Riverdale Rd., College Park, GA 30349; (404) 991-2225

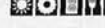


Sugar Bowl R/C Speedway, 5272 North Ave., Sugar Hill, GA 30518; Shelley or Jan Bailey, (404) 945-6709



HAWAII

Garden Isle R/C Racers, P.O. Box 3593, Lihue, HI 96766; Eric Leano, (808) 246-8856



IDAHO

Capital Dirt Burners, 1945 N. Teare Ave., Meridian, ID 83642; Jim Brandon, (208) 888-7079



Falls Hobbies & R/C Raceway, 1515 Northgate Mills, Idaho Falls, ID 83401; (208) 529-8650

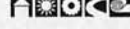


ILLINOIS

AJ's Raceway, Kesslinger Road, Dekalb, IL 60115; A.J. Schultz, (815) 756-2772



BARR, 809 River Dr., Byron, IL 61010; Jim Haynes, (815) 234-5615



C&R Hobbies, 39 E. Jones, Milford, IL 60953; Ray Craighead, (815) 889-4073



Cedarville R/C Speedway, 430 W Washington, Cedarville, IL 61013; Troy Pokoj, (815) 745-2885



Centennial Park/LeMont Dirt Burners, 7827 Rohrer Dr., Downers Grove, IL 60516; Scott Moravik, (708) 968-6411



Central Illinois Max Track, 1013 Iowa St., Ashmore, IL 61912; Josh Carter, (217) 349-8824



Diehard R/C Raceway, 300 N. Main, Kewanee, IL 61443; Dick Jennings, (309) 852-3700



Hobby Town Raceway, 4611 W. Rt. 120, McHenry, IL 60050; Mike Hollingsworth, (815) 344-1777



Leisure Hours R/C Raceway, 24121 W. Theodore, Bldg. 1, Plainfield, IL 60544; Scott Hill, (815) 439-1777 (track), (815) 439-1477 (shop)



Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-1311



Marty's R/C Hobby, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441



Mitey Motor Speedway, 1109 N. Bloomington St., Rte. 23, Streator, IL 61364; Doug, (815) 672-4212



Monroe R/C Raceway, 26049 Ridgeland Ave., Monroe, IL 60449; Roy or Roberta Moody, (708) 534-2422 (track), (708) 799-5597



Peoria R/C Raceway, 518 Hillsdale Ave., Peoria, IL 61604; Ray Tigue, (309) 672-1780



R/C Workshop, 3100 S.W. Adams St., Peoria, IL 61605; Al Kretz, (309) 673-4860



Radio-Active Raceway, 751 N. Bolingbrook Dr., #15, Bolingbrook, IL 60440; Jim, (708) 759-7557



Redline Raceway, 921 Harding, Calumet City, IL 60409; (708) 862-8181



Shiloh Eagles Superspeedway, 308 N. Virginia Ave., Belleville, IL 62220; (618) 277-6030



SIRCAR Raceway, 1200 N. Marion, Carbondale, IL 62901; (618) 549-5885



Slot and Wing Hobbies "Race Place", 1615 W. Springfield, Champaign, IL 61821; (217) 359-1920



Superior Raceway, 1706 W. Bradley, Champaign, IL 61821; (217) 359-8073



Super Stock Speedway, 54 Bonnenstiehl Rd., Collinsville, IL 62234; Thomas Smith, (618) 632-2615



INDIANA

Autograph/Race World, 231 Pendleton Ave., Pendleton, IN 46064; Sam Mudd, (317) 778-3386



Blaze'n Race'n, P.O. Box 6, Hamlet, IN 46532; James Berndt, (219) 867-1324



Elliott's R/C Raceway, 2140 North Plate, Kokomo, IN 46901; (317) 452-0163



Hobby Barn Raceway, 1950 Springhill, Terre Haute, IN 47802-9694; (812) 299-5773



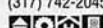
K&L Hobbies & Raceway, 3275 North 525W, LaPorte, IN 46350; (219) 324-0353



Kokomo Hobby & Radio Raceway, 1108 E. Markland, Kokomo, IN 46901; (317) 457-5060



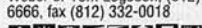
Main Hobbies, 625 Columbia, Lafayette, IN 47901; Randy Palmer, (317) 742-2045



Maple City Speedway, 1651 W. Franklin St., Elkhart, IN 46516; Pete Russell, (219) 293-1827



P&T Hobbies and Raceway, RR 2 (Hwy. 60), Mitchell, IN 47446; Paul Weber or Tom Logsdon, (812) 849-6666, fax (812) 332-0018



RC Barn, 310 N. 125 W., Monroe, IN 46772; Mark Lengerich, (219) 692-6600



R/C World of Indiana, RR #2, Box 335, Lynn, IN 47355; (317) 874-2464



Racer's Choice Raceway, State Rd. 256, Jefferson Co. 4-H Fairgrounds, Madison, IN 47250; Eric Burns, (812) 866-5521



Rimfire Raceway and Hobby Shop, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



The Rink, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



IOWA

Dubuque R/C Speedway, Dubuque County Fairgrounds, Dubuque, IA 52001; Paul Conlon, (319) 556-2736



M&M Racetrack, 2434 Pilgrim Path, Oskaloosa, IA 52577; (515) 673-6265



Mr. Car Raceway, P.O. Box 1112, Central Iowa Fairgrounds, Marshalltown, IA 50158; Jim Gossett, (515) 483-2234



Radio Control Raceway Park, 746 South 30th St., Fort Dodge, IA 50501; Bernie Halverson, (515) 576-3780



Sibley Raceway, Osceola County Fairgrounds, Sibley, IA 51249; Allen Reck, (712) 754-2604



Southwest Iowa Hobbies 'n' R/C Raceway, 204 S. Broadway, Red Oak, IA 51566; Debbie Johnson, (712) 623-5513



KANSAS

Dave's Hobbies & Things, RR2, Box 150, Cherryvale, KS 67335; David Carey, (316) 336-3683



M&M R/C Superspeedway, 2400 Broadway, Parsons, KS 67357; Mark and Melissa Brown, (316) 421-6742 or (316) 421-5006



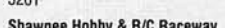
R/C Superdrome & TQ Pro Shop, 14 E. Ave "A", Hutchinson, KS 67501; Joe Jandrakovic, (313) 665-6633



R/C World Raceway, 217 Brownie Ave., Scranton, KS 66537; Corky or Pam Green, (913) 793-2313



RCRC Raceway, 507 N. 4th, Atwood, KS 67730; Bob Dunker, (913) 626-3261



Shawnee Hobby & R/C Raceway, 4603 Shawnee Dr., Kansas City, KS 66106; Bill Pugh, (913) 384-3211



KENTUCKY

Bluegrass Int'l/Perry's R/C Hobbies, 214 Globe St., Radcliff, KY 40160; William Perry, (502) 351-RACE



Checkered Flag Raceway, 1790 Bryan Station Rd., Lexington, KY 40505; Billy or Jay, (606) 293-6825



ProTrak R/C Racing, 3451 Cane Run Rd., Louisville, KY 40211; Tony Hardin, (502) 778-2657



West Kentucky R/C Hobbies, 45 Hawkins Loop, P.O. Box 21, Symsonia, KY 42082; (5

PRO-LINE TRACK DIRECTORY

Capital Area Racing Society, The Plumbers Hall, 5405 S. Logan, Lansing, MI; Dave Halsey or Brad Smith, (517) 646-8224 or (517) 484-4028



Can-Am Hobbies Speedway Park, 1152 Gratiot, Marysville, MI 48040, Don Grinde, (313) 364-3338



Chatter Box Racing, P.O. Box 164, Old State Rd., Central Lake, MI 49622; Bill Altergott, (616) 544-9829



Doug's Dirtway, 5210 Colby Rd., Owosso, MI 48867; Doug Conn, (517) 723-3368



JJ's R/C Speedshop, 5713 13 Mile Rd. (corner of 13 and Mound), Warren, MI 48092; (810) 977-0420; fax (810) 977-7290



Ludington R/C Raceway, 1483 N. Dennis Rd., Ludington, MI 49431; (616) 843-4654



MCR/C Raceway, 4601 Page Ave., Michigan Center, MI 49203; Sam Sprang, (517) 787-9161



Newberry R/C Raceway, RR 3 Box 2860, McMillan, MI 49853; Dustin Hart, (906) 293-3044



Pointe R/C, 2119 Summerton Rd., M. Pleasant, MI 48858; (517) 773-5711



R&L Hobbies, 9782 Portage Rd., Kalamazoo, MI 49002; Rex Simpson, (616) 323-3686; fax (616) 329-1744



Rainbow Gardens, 600 North Shore Ave., Crystal, MI 48818; Mike or Sandy, (517) 235-4298



Rider's Super Speedway, 42040 Koppernick Rd., Canton, MI 48187; Brent Martin, (313) 981-8700 or (313) 451-5599



Scale Racing Center, 3432 Highland Rd., Waterford, MI 48328; Larry Rossi, (810) 683-5529



T/A Raceway, 119 N. Michigan, Big Rapids, MI 49307; Harvey, (616) 796-3217



Village Hobbies-n-Crafts, 195 N. Elm, Hesperia, MI 49421; Alan or Fran, (616) 854-1374



Westside R/C Raceway, 4335 Lake Michigan Dr., Grand Rapids, MI 49504; George Oriukowski, (616) 791-9902. (Open May through August)



MINNESOTA

Badger R/C Raceway, 404 Tamarack St., Box 101, Badger, MN 56714; Keith Cumming, (218) 386-2001



C/S Speedway, 312 N. Bdwy, Crookston, MN 56716; Caesar Kaiser, (218) 281-6665



Grand Rapids R/C Speedway, 2209 Hwy 2 East, Grand Rapids, MN 55744; Aaron Voges, (218) 326-6751



Greater Minnesota Racetrack, 3302 Southway Dr., St. Cloud, MN 56301; Jon Jackson, (612) 252-9768



Larry's Raceway Park, 105 3rd Ave. NE, Glenwood, MN 56334; Dan Winter, (612) 634-5246



Minn-E-Golf & Hobby, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365



Paul Bunyan Raceway, Rte. 1, Box 468, Bemidji, MN 56664; Brad Trask, (218) 243-2749



Range Racing World R/C Speedway, 412 Jones St., Eveleth, MN 55734; Bill, (218) 744-4423



Southside Speedway, 2241 Marion Rd. SE, Rochester, MN 55904; Kevin Guy, (507) 281-3233



Trackside Racing, 2300 Myrtle Ave., St. Paul, MN 55114; Winton Offelie, (612) 644-3424



Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248



MISSISSIPPI

Crossroads Raceway, 904 Cass St., Corinth, MS 38838; Ronnie Inman, (601) 287-7169



Fast Freddy's Raceway, 20390 Hwy. 49, Saucier, MS 39574; Mark Payne, (601) 832-0315



Joe McFadden Hobbies, 1619 51st Ave., Meridian, MS 39307; Joe McFadden, (601) 483-7000



Rural Hill Raceway, 2535 Tabernacle Rd., Columbus, MS 39702; Jeffrey Alvey, (601) 328-9429



Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST



MISSOURI

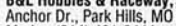
All Seasons Hobby, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767



ARC Raceway, 109 South High St., Jackson, MO 63755; Burt, (314) 243-1371



B&L Hobbies & Raceway, 2800 Anchor Dr., Park Hills, MO 63061; Bob Marler, (314) 431-9444



Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238



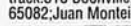
Columbia R/C Trax, 1502 W. Bus Loop 70 (Exit 125), Columbia, MO 65202; Gary Phillippe, (314) 682-3993



Extreme Edge Speedway, 119 W. Liberty St., Farmington, MO 63640; Ken Boren, (314) 756-4122



Fast Trax Racing Assoc., mailing: 206 N. Water, Nixa, MO 65714; track: 318 Boonville, Springfield, MO 65082; Juan Montell, (417) 725-4337



Lafayette Riverside Raceway, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Laningham, (314) 966-8912



Ozark's R/C Raceway, Hwy 13, Brighton, MO 65781; Gene Rhodes (417) 742-4376 or Ron Hawkins, P.O. Box 460, Willard, MO 65781, (417) 742-2561



Suppenbach Winter Racing, Route 5, Box 66, Pleasant Hill, MO 64080; Larry Suppenbach, (816) 987-5828

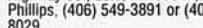


MONTANA

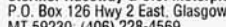
Bozeman R/C Powerhouse Track, 2825 W. Main (west side of Main Mall), Bozeman, MT 59715; (406) 586-0071



Garden City R/C Raceway, 11885 1/2 Highway 93., Lolo, MT 59847; Doug Phillips, (406) 549-3891 or (406) 728-8029



Stormer Raceway & Slot Motorplex, P.O. Box 126 Hwy 2 East, Glasgow, MT 59230; (406) 228-4569



NEBRASKA

Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865



River City Racing, Aksarben Field, Sales Pavilion, Omaha, NE 68164; Robert Conner, (402) 431-0482



The Salvation Army, 4032 Harrison St., Omaha, NE 68147-1012; Lt. Michael Delashmit, (402) 634-3414



Wild Card Raceway, RR1 Box 137, Columbus, NE 68601; Roger F. Miller, (402) 564-7743



NEVADA

Radio Controlled Race World, 905 So. Rock Blvd., Sparks, NV 89431; James or Barbara Balough, (702) 356-2882



Silverbowl Speedway, 7274 Hardtack Cir., Las Vegas, NV 89119; Mike, (702) 896-3577



NEW HAMPSHIRE

Economy R/C Speedway, 4 Maple St., Winchester, NH 03470; Harold Thomas, (603) 239-4482 or 239-6470



Fastracker Club, 520 Washington St., Keene, NH 03431; Bill Phillips or John O'Connor, (603) 352-0811 or 357-8393



Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549



Lake Region R/C Speedway, Lily Pond Rd., Laconia, NH 03246; Louie Blais, (603) 524-2909



Robert's Railroad & Hobbies, Box 431, Rt. 4 at Rt. 152, Northwood, NH 03261; Robert Jeffers, (603) 942-5193



NEW JERSEY

Bob's American Raceway, 142 Wilson Ave., Englishtown, NJ 07726; Bob Morrisco, (908) 446-3737



Family Hobbies Raceway, 3576 N.W. Blvd. & Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790



Golden Hobbies & Crafts, 415 Erial Rd., Pine Hill, NJ 08021; (609) 782-1222



Jefferson Speedway, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525



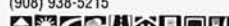
LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122



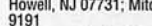
Pit Stop Dragway, Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-RACE (7223)



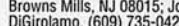
The Race Place, 1151 Hwy 33, Farmingdale, NJ 07731; John Fary, (908) 938-5215



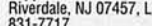
Spernell Speedway, 2301 Rte 9 North, Great American Flea Market, Howell, NJ 07731; Mitch, (908) 577-9191



On Trax Hobbies, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422



Zeppelin Hobbies, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717

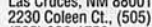


NEW MEXICO

Las Cruces R/C, 3110 Hillsdale, Las Cruces, NM 88005; Bob Risner, (505) 523-1962



Meerscheidt R/C Raceway Park, Walnut and Hadley, Meerscheidt Park, Las Cruces, NM 88001; Wayne Ward, 2230 Coleen Ct., (505) 523-4863, (505) 326-1758



NEW YORK

Beach Hill Speedway, 1760 Beach Hill Rd., Watkins Glen, NY 14891; Jim Riley, (607) 535-2616



Brockport Speedway, 6000 Sweden Walker Rd., Brockport, NY 14420; Gil & Betty Glidden, (716) 637-6224



Brownie's Pro & Sport Hobbies, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194



Capital District R/C Racers, 27 Venus Dr., Albany, NY 12205; Keith Green, (518) 783-7859



Central New York R/C Auto Racers, Martin St., P.O. Box 116, Rome, NY 13440; John Orr, (315) 336-5140



Chipmunk Hill R/C Speedway, 217 Pine St., Theresa, NY 13691; Ted or Pete House, (315) 628-5065



Competition Hobby Supplies, 1006 Loudon Rd., Rte. 9, Latham, NY; (518) 786-3622



East Coast Barn Stormers, MD #1 Old Oxford Rd., Chester, NY 10918; Michael or Lou, (914) 469-8206



East End Off-Roaders, 7335 Main Rd., Mattituck, NY 11952; Wally, (516) 298-2020



Jerry's Raceway, 111 S. Applegate Rd., Ithaca, NY 14850; Jerry and Lori Achilles, (607) 277-0940



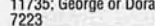
LI 1/4-Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384



The Model Shop, 1 Lakewood Ave., Monticello, NY 12071; Richard Cimino, (914) 791-6075



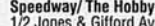
1/10 Raceway and Hobbies, 168 Broad Hollow, Farmingdale, NY 11735; George or Dora, (516) 845-7223



Performance Hobbies Raceway, 205 North Ave., Webster, NY 14580; Anthony Cenzi, (716) 621-1274



Performance Plus Radio Control Speedway/The Hobby House, 1141 1/2 Jones & Gifford Ave., Jamestown, NY 14701; (716) 488-1772



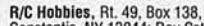
Peter's R/C Raceway, Rte. 36, Leicester, NY 14481; P. Gerald Scorsone, (716) 382-3126



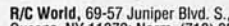
R/C Competition Corner, K-Mart Plaza, Matlydale, NY 13211; (315) 455-8718



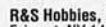
R/C Hobbies, Rt. 49, Box 138, Constantia, NY 13044; Roy Catholdi, (315) 623-9536



R/C World, 69-57 Juniper Blvd. S., Queens, NY 11379; Norm, (718) 326-0002



R&S Hobbies, 356 Macedon Ct. Rd., Fairport, NY 14502; (716) 425-3722



KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

RACING TO BRING YOU THE BEST!

PROTOform. RACE BODIES

Pro-Line starts off 1995 with two slam dunks at the Winter Champs!



At the Winter Championships in Tampa, FL, Rick Hohwart took the top qualifying honors after three gruelling rounds of racing in the Modified Truck class. Rick drove his RC10T2 to the TQ position on a set of "Originals" Pro-90 Mini-Pins and a pair of Edge Pro-95s to steer his truck in the right direction. Not to be outdone, Mark Pavidis dominated the 2WD A-Main using a set of "Flat Fuzzies" PRO-83M2 (#8083M2) to pull off a decisive win. Pro-Line's new M2 Compound series were the tires of choice when the blue groove developed at the Tampa track.

Remember, Pro-Line was the first to bring you the Mini-Pin Design, the Fuzzie, the Edge and the first soft compound "XTR" and is, again, the first with the new super-soft compound, XTR-M2.

Pro-Line is the current World Champion in both 2WD and 4WD. Pro-Line...often imitated, but never duplicated!

New M2 Part Numbers (Team Compound)

Stock #	Description
8083M2	Pro-83 M2 "Flat Fuzzie" 2.15" 2WD or 4WD buggy rears, super-soft XTR-M2 compound
8088M2	Pro-88 M2 "Flat 80s" Mini-Pin 2.15" 2WD or 4WD buggy rears, super-soft XTR-M2 compound
8090M2	Pro-90 M2 "Originals" Mini-Pin 2.2" truck rears, super-soft XTR-M2 compound
8092M2	Pro-92 M2 "Fuzzie T" 2.2" truck rears, super-soft XTR-M2 compound
8096M2	Pro-96 "Stubbie T" 2.2" truck rears, super-soft XTR-M2 compound

New Pro-Line Part Numbers (Hawg Heaven!)

Stock #	Description
1066	AC-66 XTR-M2 Sedan Hawgs fits narrow Tamiya touring sedan wheels
1068	AC-68 Front F1 Hawgs (semi-pneumatic) fits Pro-Line wheel #2587
1069	AC-69 Rear F1 Hawgs (semi-pneumatic) fits Pro-Line wheel #2588

New PROTOform Part Numbers (Hot Race Bodies!)

Stock #	Description
1208	'95 Grand Prix SS (regular or lightweight)
1209	'95 Monte Carlo SS (regular or lightweight)
1211	'95 Chevy SuperTruck narrow (regular or lightweight)
1403	F1 Type M P4/9 fits HPI and Tamiya F1 kits (regular weight)
1404	F1 Type B 8-195 fits HPI and Tamiya F1 kits (regular weight)
1405	Saturn SC2 Touring Sedan fits YR-4 and Tamiya F1 kits (regular weight)
1509	'95 RAMbunctious "ET" fits the electric RC10T

PRO-LINE / PROTOform

RACING TO BRING YOU THE BEST!

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Rampage R/C, 27 Fuller Ln., Hyde Park, NY; Brian Walker, (914) 229-2456



Ransomville R/C Raceway, 2576 Academy St., Ransomville, NY 14131; Irene Preisch, (716) 791-8310



Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600



Small Torque Racers of Long Island, 24 Horton Dr., Huntington Station, NY 11746; George Franz, (516) 271-1119



Speedworld R/C Raceway, Rte. 12, Chenango Forks, NY 13746; Mike Magnusson, (607) 648-2063



South Shore Hobby & Raceway, W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567



Transit Speedway & Hobbies, 5319 Transit Rd., Depew, NY 14043; (716) 684-7368



Ulster County Speedway, P.O. Box 131, New Paltz, NY 12561; Joe Colombo Jr., (914) 754-7664



Valley Hobbie Inc., 2714 Main Ave., Fargo, ND 58103; Craig or Keith, (800) 493-9971



Westfield R.C. Speedway, 27 Clark St., Westfield, NY 14787; John or Jared Lindstrom, (716) 326-2339



Walt's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291



NORTH CAROLINA

The Antique Barn, 2810 Forest Hills Rd., Wilson, NC 27893; Steve Limpsalot, (919) 237-6778



Badin Shore Raceway, 1730 Jackson Lake Rd., High Point, NC 27263; Jimmy or Tim Martin, (910) 431-6407



C/C Hobby Speedway, 8358 U.S. Hwy. 220 Bus. N., Randleman, NC 27317; Steve & Mary Cox, (910) 495-3482



C&H Raceway, 1400 N. Cannon Blvd., Kannapolis, NC 28083; Camera & Hobby Shop, (704) 933-5321



Cape Fear Speedway, 207 Harley Rd., Wilmington, NC 28401; Bob Justice, (919) 762-1184



Carolina Dragway, 907-D Warsaw Rd., Clinton, NC 28328; (910) 592-4569



Carolina Hobbies R/C Raceway, Route 1, Box 158, Taylorsville, NC 28681; Kim & Roseanne Kulawik, (704) 495-4040



Clapp's R/C Motor Speedway, Rt. 4, Box 300A, Siler City, NC 27344; Al Clapp, (919) 663-3198



Clinton R/C Raceway, 907-C Warsaw Rd., Clinton, NC 28328; Corbitt Marshburn (919) 592-9489



Hobbies, Etc., 5540 Atlantic Springs, Raleigh, NC 27604; Don Asplen, (919) 790-1444



Hobby Park Dragway, W. Clemmons Rd., Winston-Salem, NC; Jack Wright, (919) 983-9416



Hobby Park, W. Clemmons Rd., Winston-Salem, NC 27103; Dick Butler, Parks & Recreation, (919) 727-2063



Motorlead R/C Raceway, 125 Park St., Canton, NC 28716; (704) 648-7911



Ride & Slide R/C Raceway, 5319 Yadin Rd., Fayetteville, NC 28303; Jim Woodman (910) 425-5276 or Bill Culbertson (910) 867-4202



Rosewood Speedway, Rt. 5, Box 853, Goldsboro, NC 27530; Glenn Elam, (919) 731-4734



S&B Speedway & Hobbies, Rt. 1, Box 311A, Farmville, NC 27828; Ricky Strickland, (919) 753-4422



Sandhills Raceway Inc., US #1 South, Aberdeen, NC 28315; (919) 944-7414



Winston R/C Drag Series, W. Clemmons Rd., Winston-Salem, NC 27106; Jack Wright, (910) 922-3800

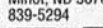


NORTH DAKOTA

Hacienda Hills Speedway, 20 Hacienda Hills, Minot, ND 58701; Kenny Duchscherer, (701) 839-4419



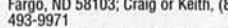
Northern Mini Racers, P.O. Box 415, Minot, ND 58702; Roger Lee, (701) 839-5294



Surrey International Raceway, RR 1, Box 37, Norwich, ND 58768; Marlen Lenton, (701) 728-6760



Valley Hobbie Inc., 2714 Main Ave., Fargo, ND 58103; Craig or Keith, (800) 493-9971

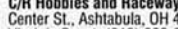


OHIO

Aerotech Raceway, 409 Applegrove Rd., North Canton, OH 44720; (216) 499-1300



C/R Hobbies and Raceway, 323 Center St., Ashtabula, OH 44004; Virginia Gagat, (216) 992-3833



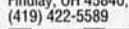
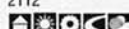
D&J R/C Raceway, 801 W. Market St., Orrville, OH 44667; Don Yoder or Mark Nussbaum, (216) 682-4266



D&S Hobbies Raceway, 7701 Crile Rd., Concord, OH 44077; (216) 354-2112



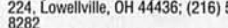
Flag City Raceway, 3772 C.R. 18, Findlay, OH 45840; Ruth Hubbard, (419) 422-5589



Fun For All, 675 College Dr., Batavia, OH 45103; Dan England/Steve Smith (513) 732-0440



Hobby Mania Raceway, 6597 Route 224, Lowellville, OH 44436; (216) 536-8282



Pro-Line/JACO and PROTOform 1995 Assault!

The Pro-Line/JACO and PROTOform assault on the on-road racing scene continues! The combination of our tires and bodies set the pace and dominated the Winter Blast in both 1/10 and 1/12 scale at K/N Raceway in Connecticut. On the other coast, at the Asphalt Oval Challenge at Racer's Heaven in Bakersfield, CA, Sean Young took a PROTOform Chevy Supertruck (#1211) combined with JACO foams and set the track record, TQ'd and won the A-main! In 1/10-scale Modified, Tony Neisenger used a 1995 Monte Carlo (#1209) while Rob Russell dominated the expert class with the new 1995 Grand Prix (#1208). Pro-Line/JACO continues to manufacture high-quality tires at a fair price, and they work better than any other tires available. PROTOform is the current World Champion and manufactures the finest-quality race bodies in the R/C car market.

Available in April 1995, Pro-Line/JACO 1/12-scale tires are coming in all compounds, including standard and exotic foams.

Pro-Line/JACO and PROTOform are sponsoring both the NORRCA 1995 Road Course Series and the 1995 NORRCA Road Course Nationals. For more information, contact JR at NORRCA (909) 944-5381.

Racing Hint #2

With the outdoor racing season just around the corner, more and more races will be held on asphalt surfaces. From parking lots to prepared tracks, racers will be scrambling for that extra edge in performance. This season, that extra edge can be found, of all places, in your tires! That's right! We at Pro-Line/JACO have developed tires ideally suited for abrasive asphalt surfaces. Our purple fronts (#2125) and purple rears (#2143) will last longer and will outperform standard greens and blues on an oval track, while our pink fronts (#2124) and pink rears (#2142) are ideal for roadcourse racing.

Parking Lot Hint #2

Are you tired of mounting tires for your Tamiya F1? Well, those days are over! Pro-Line/JACO is proud to announce the introduction of a full line of mounted and trued tires in all the popular compounds for Tamiya F1 cars. They are ready to bolt on and go! No glue, no tape, no hassle—just pure fun!

PRO-LINE

PROTOform

P.O. Box 456, Beaumont, CA 92223;
(909) 849-9781; fax (909) 849-2968

Innovative Hobbies/Lakeside Speedway, 3427 Manchester Rd., Akron, OH 44319; (216) 645-1333



JB Hobby & Raceway, 8760 St. Rt. 201, Tipp City, OH 45371; Bob Curtis, (513) 845-8222



Kent Hobby, 832 N. Mantua St., Kent, OH 44240; Bob Sabo, (216) 673-0422



Lafferty R/C Raceway, Box 153, 70228 Hurrah St., Lafferty, OH 43951; Chris Christman, (614) 968-4818



Lewisburg R/C Raceway, 395 US Rt. 40E, Lewisburg, OH 45338; Bob Harting, (513) 678-8404 or (614) 889-0876



Medina R/C Raceway, 754 N. Court St., Medina, OH 44256; Bill Aholt, (216) 723-0255



Mr. T's R/C Super Speedway, 5540 CR 16, Wauson, OH 43567; Nick Tinsler, (419) 335-3196



Scoters Hobby Hut, 234 #D Robbins Ave., Niles, OH 44446; Dave "Scooter" Evans, (216) 544-9411



T.A.R.C.A.R., 632 Eckle Rd., Perrysburg, OH 43051; Bill Bridges, (419) 826-3859 or Dave Scanes, (419) 893-1916



Y-City Hobby & Speedway, 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (614) 455-3025



OKLAHOMA

Adams Creek R/C Speedway, 5207 S. 194th E. Ave., Broken Arrow, OK 74014; John Beighle, (918) 355-1416



Competition R/C, 180 SE 89th, Oklahoma City, OK 73149; James or Louise Brown, (405) 634-0809



Coweta Hobby & Speedway, 310 S. Broadway, Coweta, OK 74429; Deriald Seabolt, (918) 486-3948



Off-Road Car Assoc. of Tulsa, 9720 Swan Dr., Broken Arrow, OK 74014; George Gooch, (918) 486-4528



Wild Country Speedway, 127 South Main, Porter, OK 74454; Charles McCollough, (918) 685-0372 or (918) 687-1686



OREGON

Cathie's R.C. World 443 So. Calapooia, Sutherlin, OR 97479; Wes/Cathie Buzzard, (503) 459-2746



Competition Racing Assoc., 17941 NE Glisan, Portland, OR 97230; Mark Taylor, (503) 257-0796



Junior Vehicle Speedways, 3090 Starwood Ct., Medford, OR 97501; (503) 779-3090



North Lawrence Raceway, 36 N. Lawrence, Eugene, OR 97401; Gary Hill, (503) 484-9857



R/C Plus Hobbies Raceway, 2029 25th St. SE, Salem, OR 97302-1130; Ron Smith, (503) 364-9188



R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501; (503) 779-8298



Yamhill County R/C Car Club, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234



PENNSYLVANIA

Benders Junction Speedway, 2300 Benders Dr., Bath, PA 18014; Gerald Wambold Jr., (610) 759-0161



Brookville Hobby Shop, 170 Main St., Brookville, PA 15825; Mark Tonell, (814) 849-7385



CEB Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Booze, (717) 375-4635



Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch, (814) 765-3045



Clearfield R/C Raceway, 4 Capricorn Ct., Clearfield, PA 16830; Shawn Richards, (814) 765-5608



Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506



DC Ultra Trax, 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200



Dreamboat Hobbies, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052



East St. Raceway, 736 E. Railroad Ave., Verona, PA 15147; (412) 826-0602



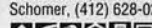
Henning Scale Models R/C Raceway, 128 S. Line St., Lansdale, PA 19446; Bill Henning, (215) 362-2442



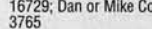
Hipkins Hobbies Raceway, 402 W. Avondale-New London, West Grove, PA 19390; Doug Hipkins, (215) 869-8585



Hobbies & Stuff, 116 West Apple St., Connellsville, PA 15425; Mark Schomer, (412) 628-0228



Hobby America Raceway, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765



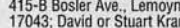
Hobby House Raceway, Downingtown Marketplace, Downingtown, PA 19335; J.T. Nelson, (610) 269-1300



Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866



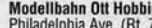
Kranzel's R/C Raceway & Hobbies, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223



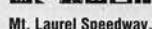
Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458



Modellbahn Ott Hobbies, 1145 E. Philadelphia Ave. (Rt. 73), Gilbertsville, PA 19525; (215) 367-5925



Mt. Laurel Speedway, 835-8 Hiester Lane, Reading, PA 19605; Joe Vaccaro, (215) 921-0176



The Mushroom Bowl, 812 W. Cypress St., Kennett Square, PA 19348; Joe, Bruce, or Drew, (610) 444-1850



Pinion Twisters, 3M Plant, Green Ln. and Mitchell, Bristol, PA; John (215) 632-9744, Bob (215) 945-0325



Pro Challenge Raceways, Wycombe Ave. (P.O. Box 536), Lansdowne, PA 19050; Bob Paulavague and Don Fewkes, (610) 622-7651



Prop & Wheels Raceway, 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (717) 668-2288



R/C Pro Speedway, Milville Rd., Bloomsburg, PA 17815; Norm Swisher, (717) 387-0266



RCO Raceway 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490



Riverside Raceway, PA Ave. W & Hickory, Warren, PA 16365; Jeff, (814) 723-4211



Road Runner Raceway, 1027 E. 7th St., Bloomsburg, PA 17815; John, (717) 784-1260



S.A. Hi Banks, Hahn's Dairy Rd., Palmyerton, PA 18071; Scott Andrews, (610) 377-6123



Sinking Spring Race Center, 237 South Hill St., Sinking Spring, PA 19608; Randy Gelsinger, (610) 670-0760



South Mountain R/C Speedway, 357 Furnace Rd., Wernersville, PA 19565; George Merkel, (215) 267-4736



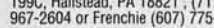
Staub Bros. R/C Speedway, 31 Locust St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445



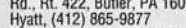
TC's R/Cs, 1537 Freeport Rd., Natrona Heights, PA 15065; Tom Coriale, (412) 226-8802



T-N-T Raceway, Randolph Rd., Great Bend, PA 18821; Ed Kraft, Rd. 1 Box 199C, Hallstead, PA 18821, (717) 967-2604 or Frenchie (607) 775-1756



Wagonhill Hobbies, 967 New Castle Rd., Rt. 422, Butler, PA 16001; Jeff Hyatt, (412) 865-9877



PUERTO RICO

Hacienda Muñoz R/C Track, Carr. #14, Juana Diaz, PR 00795; (809) 837-7083



RHODE ISLAND

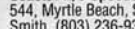
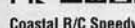
Tri-State R/C Raceway, 205 Hallene Rd., Warwick, RI 02886; Raymond Dean, (401) 738-4908



Bandit's Performance R/C Hobbies, 2037 S. Main St., Dartington, SC 29532; Bryan Howie Jr., (803) 393-3333



Coastal R/C Speedway, 8553 Hwy. 544, Myrtle Beach, SC 29577; Wendel Smith, (803) 236-9309



PROLINE TRACK DIRECTORY

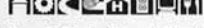
Hobbies and More, 1570 S. Main St.,
Darlington, SC 29532; Jerry Pollard,
(803) 393-0355



ORA Atomic Racing Facility, 373
Boyd Pond Rd., Aiken, SC 29803; Bill
Jackson, (706) 855-0846 or (803)
642-0314



R/C Speed Shop & Raceway, 2122
Platt Springs Rd., W. Columbia, SC
29169; Eric Prevost, (803) 791-4715



Racer's Choice Remote Control,
4014 Fernand Rd., Piney Grove
Shopping Center., Columbia, SC
29212; Clifford McLinden, (803) 561-
0000



SOUTH DAKOTA

Dakota Off-Road Racers, 2989 W. Br.
Co. 12, Aberdeen, SD 57401; (605)
226-0604



TENNESSEE

Action Hobby Shop, 3723 S.
Mendenhall, Memphis, TN 38115;
Brian Stricklin or Justin Austen, (901)
365-2620



Cumberland Valley Raceway, P.O.
Box 233, Ashland City, TN 30715;
Jamie Pate, (615) 792-4371, ext. 1195



D&M's Downtown Raceway, 2703 US
Hwy. 411S, Maryville, TN 37303;
(615) 681-8919



Machine-Head Straits, 938
Grandmore Rd., Lawrenceburg, TN
38464; Larry and Eliane Sanders,
(615) 762-6630



MSA R/C Racing, Rt. 12 Box 489 B,
Crossville, TN 38555; D.R. Findley,
(615) 456-0027



Robertson's R/C Raceway, 175
Seavers Rd., Jackson, TN 38301;
Travis Robertson, (901) 424-6423



Sparta Raceway Park, 32 N. Main St.,
Sparta, TN 38583; Carl (Buddy)
Elrod, Rt. 5 Box #652, Sparta, TN
38583, (615) 836-8450 or (615) 761-
3407



Tri-County R/C Raceway, 919 Little
Dogwood, 1312 Kingston Hwy.,
Kingston, TN 37763; Dwayne Romine,
Kyle Romine, (615) 376-2330, 376-
9955



TEXAS

AA Raceway, 1617 Foomey Rd.,
Austin, TX 78704; Wolf Gumfory,
(512) 474-8277



Austin R/C Center, 9702 Gray Blvd.,
Austin, TX 78758; Caton Cobb, (512)
832-8144



Big Mike's R/C Raceway, 1405 W.
Cotton St. (behind the Locker Room),
Longview, TX 75604; (903) 297-7814



Eastex Raceway, 45000 Hwy. 59 N.,
New Caney, TX 77357; Heinz Falke,
(713) 399-1527



Hal's Hobby Raceway, 1440
Bessmer, El Paso, TX 79936; (915)
591-2213



Heart o' Texas Hobbies & Raceway,
309 W. Hwy. 190, Copperas Cove, TX
76522; Larry Gholson, (817) 547-
7505



Hobbycraft Speedway, 819 N. Main
St., Corsicana, TX 75110; Keith
Hoffman, (903) 872-6761



Houston R/C Hobbies, 6338 Skyline
Dr., Houston, TX 77057; Lynn Cramer,
(713) 266-6006



Indy R/C World, 220 Mesquite Village,
Mesquite, TX 75150; (214) 271-4844



Keyser's Hobbies, 1643 Texas,
College Station, TX 77840; Bill
Bennett (409) 693-8095



Rivercity Speedway, 11731 Wetmore,
San Antonio, TX 78247; Ralph
Hernandez, (210) 359-6870; Joe
Toledo, (210) 341-5652



Star/Car Raceway, 5802 Patton St.,
Corpus Christi, TX 78415; Mike
Hellums, (512) 289-0066; Race
Hotline, (512) 881-6105



Star Hobbies, 1200 Hwy. 100, Box 5,
Port Isabel, TX 78578; Fred Carr,
(512) 943-7546



T&T Eagle, 161 W. Spring Creek
Pkwy., #601, Plano, TX 75023; Tony
Welborn, (214) 517-0562



Texas Speedway, 6707 Chimney
Rock, Bellaire, TX 77401



Wild Bill's Raceway, 535 E. Shady
Grove, Irving, TX 75060; Lynn Morgan
or Jerry Williams, (214) 438-9224



UTAH

Fastrax, 355 N. 700 E., Price, UT
84501; Dave Johnson, (801) 637-
6603



Hansen Intermountain R/C Raceway,
8481 W. 2700 S., Magna, UT 84044;
Kevin Hansen, (801) 250-6303



Power Hobbies and Raceway, 135
No. 900 E., Suite 7, St. George, UT
84770; April Nutley, (801) 628-8747



WOR Raceway, 3170 Brinker Ave.,
Ogden, UT 84401; Brian Worton,
(801) 393-2530



VERMONT

Bradford R/C Racing, Main St.,
Bradford, VT 05033; Seth Bean, (802)
222-9674



Mike's Hobbies & Raceway, 162 N.
Main St., Rutland, VT 05701; Stephen
Rachlis, (802) 775-0059



Stoughton Pond Raceway, Stoughton
Pond Rd., Perkinsville, VT 05151; Rick
Adams, (802) 263-9321



VIRGINIA

Bob's Hobbies & Raceway, 910-J
Brandy Creek Dr., Mechanicsville, VA
23111; Bob Wagner, (804) 746-2758



Cooper's R/C Raceway, Rt. 4, Box
122B, Chatham, VA 24531; (804) 724-
4182



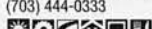
Crossroads Hobbies R/C Raceway,
1104 W. Main St., Salem, VA 24153;
Ronnie Black, (703) 387-3414



Fairystone R/C Speedway, Rt. 4, Box
918, SR635, Stuart, VA 24171; Pat
Moon Jr., (703) 930-3984



The Hobby House, 116 Edds Ln.,
Sterling, VA 20165; Ron Beckman,
(703) 444-0333



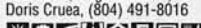
KC's Radio Control & Repair, Rt. 4,
Box 312, Trents Ferry Rd., Lynchburg,
VA 24503; Curtis or Kim Wright, (804)
384-8596



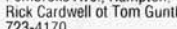
Shamroc Raceway, 2918 Packer St.,
Winchester, VA 22601; Kevin Allen,
(703) 662-0403



Timberlake Hobbies, 1400 Atlantic
Ave. #201, Virginia Beach, VA 23451;
Doris Cruce, (804) 491-8016



Trackside Hobbies, 1920 E.
Pembroke Ave., Hampton, VA 23663;
Rick Cardwell or Tom Gunther, (804)
723-4170

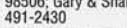


WASHINGTON

Alfie's, 108 South K St., Aberdeen,
WA 98520; (206) 533-6638



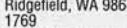
Four Season R/C Racing, 2941
Sleater Kinney Rd. NE, Olympia, WA
98506; Gary & Sharon Brown, (206)
491-2430



Hale's R/C Raceway Park, 10611
136th St. E., Puyallup, WA 98374; Walt
Hale, (206) 845-7675



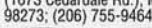
Home Town Hobby, 116 N. Main Ave.,
Ridgefield, WA 98642; (206) 887-
1769



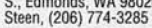
L&L R/C Raceway, 15818 S.E. 287th,
Kent, WA 98042; Bob Lewis, (206)
631-1664



Performance R/C, P.O. Box 955
(1673 Cedardale Rd.), Mt. Vernon, WA
98273; (206) 755-9464



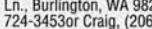
Raceway Hobbies, 188 Sunset Ave.
S., Edmonds, WA 98020; Dave or Ron
Steen, (206) 774-3285



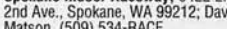
Schmidt's Auto Parts, 10305 Old
Hwy. 99, Marysville, WA 98271; Jon
Failla, (206) 653-8838



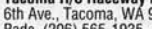
Skagit R/C Raceway, 1689 Routon
Ln., Burlington, WA 98233; Jeff, (206)
724-3453 or Craig, (206) 755-9464



Spokane Indoor Raceway, 6422 E.
2nd Ave., Spokane, WA 99212; Dave
Matson, (509) 534-RACE



Tacoma R/C Raceway Hobbies, 6305
6th Ave., Tacoma, WA 98406; Neil
Bade, (206) 565-1935



Terror Raceway, 8012 S. Tacoma
Way, Tacoma, WA 98499; Dave
Kleinman, (206) 584-8659



WASHINGTON, D.C.

BAFB R/CAR, Bolling Air Force Base,
Washington, D.C. 20332; Charles
Leadbetter, (301) 297-4524



WEST VIRGINIA

Burr-Fab Raceway, 90 Davis St.,
West Union, WV, 26456; Mark Travis,
(304) 873-2487

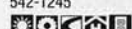


Fulton's R/C Raceway, 2646 Chapline
St., Wheeling, WV 26003; James
Fulton, (304) 233-5355



WISCONSIN

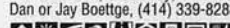
ABC R/C, 1441 B East Main St.,
Waukesha, WI 53186; Dick, (414)
542-1245



Antigo Hobby, 311 Superior St., Suite
7, Antigo, WI 54409; (715) 623-7655



Bayland Hobbies, 951D
Ashwaubenon, Green Bay, WI 54304;
Dan or Jay Boettge, (414) 339-8288



JJ's Dirt Heaven, 6028 County K,
Champion, WI 54229; (414) 866-9096



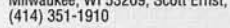
R/C Hobby Off-Road Track, Lewison
Lane, Viroqua, WI 54665; Dan and
Diane Sawwell, (608) 637-8221



Radio Mania, 129 Harrison St., North
Prairie, WI 53153; Bill Bowes, (414)
392-9515



**S&N's Trackside Hobbies and
Raceway**, 6045 N. Green Bay Ave.,
Milwaukee, WI 53209; Scott Ernst,
(414) 351-1910

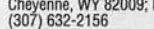


Sparta R/C Raceway, R&S, Sparta,
WI 54656; Eric Johnson, (608) 269-
6613



WYOMING

**Collectable Creations Off-Road Oval
Track**, 1790 Dell Range Blvd.,
Cheyenne, WY 82009; Phil Severson,
(307) 632-2156

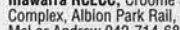


AUSTRALIA

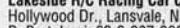
Aubry R/C Car Club, Aubry
Showgrounds, Aubry, NSW 2640; Ron
Langman, 060-247-128



Illawarra RCECC, Croome Sporting
Complex, Albion Park Rail, NSW 2527;
Mel or Andrew, 042-714-683



Lakeside R/C Racing Car Club,
Hollywood Dr., Lansvale, NSW 2166;
R. Bartolozzi, 62-2-907-9800

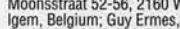


Wodonga R/C Car Club, 11 Murphy
St., Wodonga, VIC 3690; Ron
Langman, 011-6160-247-128

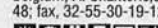


BELGIUM

Cartroubles Indoor Buggy Track, Jan
Moonsstraat 52-56, 2160 Womme-
lgen, Belgium; Guy Ermes, 32-3-326-
51-15; fax, 32-3-326-51-01



Model Racing Club Oudenaarde,
Scheldekant, 9700 Oudenaarde,
Belgium; A. Chanterle, 32-55-31-36-
48; fax, 32-55-30-19-12



BRAZIL

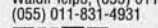
Brasilia R/C Motor Circuit,
Estacionamento do Estadio Mane
Guarrincha, Brasilia, DF 70000, Brazil;
Alexandre (Alex), 55-061-273-7205



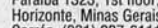
Hobby Center, SQS.210 BLH Apt. 204,
Brasilia, DF-Brasil 70.273; 061-242-
0488



Off Roaders, Av. Guillermo Dummont
Villars, 317, Sao Paulo, CEP 05640;
Waldir Ielpo, (055) 011-260-5628; fax
(055) 011-831-4931

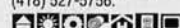


Way of R/C Off-Road Cerrado, Rua
Paraiba 1323, 1st floor, Belo
Horizonte, Minas Gerais; Claudio T.
Correa, (031) 227-6111, fax (031)
227-6869

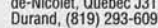


CANADA

Action Weelz, 462 Turcotte, Vanier,
Quebec, G1M 1R6; Regent Tardif,
(418) 527-5756



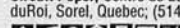
ATN, Auto Teleguide Nicolet, 2000
Rue Paul Hubert, Saint-Jean-Baptiste-
de-Nicolet, Quebec J3T 1E5; Louis
Durand, (819) 293-6097



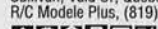
Auto Sprint, 6065 Des Grands
Prairies, St. Leonard, Quebec H3G
2R6; David Kalayjian, (514) 287-3503



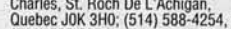
Circuit Pepsi, Centre de Location, 37
du Roi, Sorel, Quebec; (514) 746-8828



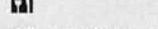
Circuit R/C Pro, 1500 Chemin
Sullivan, Val d'Or, Quebec; J9P 1M1;
R/C Modele Plus, (819) 874-3918



Circuit Teleguide St. Roch, 363-B St.
Charles, St. Roch De L'achigan,
Quebec J0K 3H0; (514) 588-4254, fax
(514) 588-6554



Club Avatt, 244 Jules-Richard,
Deauville, Quebec J1N 3M2; Daniel
Vanier (819) 864-6262



Club RCSI, 44 Rue Holliday, Sept-Iles,
Quebec G4R; Sylvio Gerard (418)
96

Interior R/C Raceway, 34-1605 Summit Dr., Kamloops, BC, V2E 2A5; Martin Vannieuwenhuizen, (604) 374-1268, (604) 374-8458

J-T International Raceway, 127 Milligan Lane, Nanpanee, Ontario K7R 8A1; N. O'Neill, (613) 354-0099

MORRAC Raceway, 6449 Crowchild Tr. SW, Box 36060, Calgary, Alberta T3E 7C8; (403) 254-1386

Prince George Radio Controlled Car Club, 202 Explorer Cres., Prince George, B.C. Y2M5R8; Doug Waller, (604) 561-0035

Quinrax Speedway, 610 Dundas St. East, Belleville, Ontario K7K 2M1; (613) 962-1414; fax (613) 962-7306

RC World, 7070 Haldibrook Rd., RR #1, Caledonia, Ontario N3W 2G8; Don Nicholls (905) 679-3177 or Keith Seguin (905) 388-9855

Ronbo's R/C Racing, RR 1 Glen Walter Cornwall, Ontario K6H 3G4; Ron Giroux, (613) 936-0176

Rousillon Hobby Track, 177-D St-Jean Baptiste, Chateaufort, Quebec J6K 3B4; (514) 698-2151

Spinnin Wheel Raceway, RR 1, Ariss, Ontario N0B 1B0; (519) 824-1614

South Okanagan Roadhogs, Skha Lake Rd., Penticton, BC; Willie Lemm, (604) 492-5698

Strathclair Park, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855

Thunder Alley Raceway, Lambton Mall, 1380 London Rd., Sarnia, Ontario N7S 1P8; Rob Smith, (519) 882-3361

COLUMBIA

Club De Automodelismo Colombiano, Centro Recreativo Cafam, Kilometro 14 Autopista Norte, Santa Fe de Bogota, D.C. Colombia; Jorge Delgado, 1-6130588

Club De Automodelismo Colombiano, Centro Comercial Guaymaral, Kilometro 16 Autopista Norte, Santa Fe de Bogota, D.C. Colombia; Jorge Delgado, 1-6130588

Garoso Raceway, Avenida Libertadores con Diagonal Gran Colombia, Cucuta, Colombia; Gabriel Rodriguez, 975-751892

CYPRUS

Racing Model Club, Kennedy Ave. N. 42, Nicosia, Cyprus; Andrea Sotiriou, 493186; fax 493229

DENMARK

Brøndby Motor Club, Roskildevejs 460 Rodov, Denmark 2610; Søren Boy Holst, 011-45-31-472-462

Holstebro R/C Buggy Club, Mozartsvej 7500 Holstebro, Denmark 2600; Michael Brushholt, 011-45-97-412-734

Klub 144 Raceway, Bagsvaerdvej 144A, 2800 Lyngby, Denmark; Henrik Carstens, 45-42-88-3691

Rainbow Raceway, Eriksvej, 9 Glostrup, Copenhagen 2600; P. Christiansen, 011-45-52-848-504

Thor Minirace Odense, Sohuesvej 255, Allose, Odense, Behind Alesso Hallen (Sport Centre), Odense, Denmark; Ulrich Rasmussen, 011-45-65-303-707

DOMINICAN REP.

Adoca R/C Speedway, Feria ganadera, Santo Domingo; (809) 220-5266

La Barranquita R/C International Speedway, Santiago; (809) 582-2303

ENGLAND

Chessington Radio Car Club, Surbiton Sport Club, Riverhill Estate, Worcester Park Rd., Worcester Park, Surrey, England; Ian Spiller, 0252-20657

FRANCE

Auto Electron, 35, rue B. de Ventadour, Limoges, France 87000; M. Boudoul, 55 062763

Crame Roncq, 64 rue du Becquerel, 59370 Moncel le Baroeul, France; Michael Hondekyn, (33) 20042755

Lorgies Bolides, rue Beau-Riz, 62840 Lorgies, France; Mme. Hourdequin Sabine

GERMANY

MC Koln, Bottgerstr., Worringen, Germany 50769; Ralf Habel, 02733-477493

Mini Car Club Dortmund, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwan, 0231/213609

Oberhausen-Alttaden, Am Fesder-turm., Oberhausen, Germany 46099; Josef Holl, 0208-403676

Panik Raceway, Teutonen Str. 5, Jroisdorf, Germany 53844; Guido Kraft, 0224-400259

Stoppelhopper Oberhausen, Niebuhrstr., Oberhausen, Germany 46049; Matthias Reckward, 02801-1545

GUAM

R/C International Raceway, P.O. Box GK, Agana; Robert (Buddy) Simpkins, (671) 477-3207

HONDURAS

Autodromo Accion, Quinta Santa Maria, San Pedro Sula, Honduras, Colonia Rivera Hernandez; Eduardo Hondal, (504) 52-2061

HONG KONG

H.K.R.C. Model Car Racing Club, Lot 2130-2137, Ko Po Tsuen, Sha Tau Kok Rd., N.T., Hong Kong; Alex Chan, (852) 659-2822

Kingsville Buggy Arena, Wong Chuk Yeung Village, Shatin, N.T.; Pak Yeung, (852) 607-0828

INDONESIA

Everly's Racing, Palm St. 188, Surabaya, Jatim, Indonesia; Jhon Mudik, 011-62-31-595-888

ISRAEL

Ircca Off-Road, Rahanana, Israel; Yaron Zafir, (972) 030549937

Nahshoneat, Abba Nilef Silver Str. 64, Haifa, Israel 32809; Golan Levy, (972) 039386444 or (972) 04231252

ITALY

Associazione Modellisti Cossato, via P. Maffei, Cossato 13014, Biella, Italy; Zanellato Romildo, 015-405881; fax 015-922709

JAPAN

Courtney Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674

Foster R/C Raceway, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674

Hansen Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674

Iwakuni R/C Racers, PSC #78, Box 3619, APO AP 96326, Tokyo, Japan; Victor Giles, 011-81-0425-52-2511 ext 225-9025

Misawa R/C Raceway, 13th Fighter Squadron, PSC 76, Box 2585, APO AP 96139-2585; 011-81-176-53-5181, ext. 226-6506

Yokota R/C Racers, PSC #78, Box 3619, APO AP 96326, Tokyo, Japan; Victor Giles, 011-81-0425-52-2511 ext 225-9025

Zama Off-Road Raceway, 17th ASGC Unit 45013, Box 3232, APO AP 96338 Japan; SFC Ken Campbell, 011-81-3117-63-8478

LEBANON

Wild Willy RCC, Oscar St-Jal Eddie, Beirut, Lebanon; 00961-1-403751

MEXICO

Alces Off Road, Lopez Mateos y Rayod S/N, Ensenada, Baja California, BC 22830; Jorge Bustamante, (667) 6-1476, 61477, 86729

Baja Jr., H. Valdez 151 Pte. Y Gmo. Prieto, Los Mochis Sinaloa 81200; Memo Asencio, Gaby Macias, 681-20276; fax, 681-26430

Club Kyosho de Automodelismo Departano, Av. Pacifico 216 Coyocacan; Ajusco-Toluca Km 15.3 DE, Mexico 04330, Ing. Jorge Perez Holder, (525) 544-08096; fax, (525) 544-7133

Hobby Centro, 12 De Diciembre No. 3070-A, Guadalajara, JAL 45550; Alejandro Ortiz Del Toro, (36) 21-46-28

Hobby's Formula, Au observatorio 457 DF 01120; (905) 502-3620

Hobby Model's Raceway, Blvd. Garcia de Leon, 1555, Morelia, Michoacan 58260; (431) 5-01-22

Jaguar R/C Club, Calz. Zavaleta 116, Puebla 72150; Chema, Denise or Chiro, (22) 31-00-91, (22) 33-00-94

La Hielera, Prol Corregidora Nte 350, Queretaro, QRO C.P. 76160; Jorge Morelos Rabell, (42) 12-15-25

Pista Casino, Hotel Casino de la Selva, Cuernavaca, Morelos 16507; Luis Duhat, (73) 19-12-38

R/C Racing Club, Obsidiana #2900, Zapopan, Jalisco 44560; Fernando Hernandez, (3) 616-73-47

Tony's Track, Obregon 364 Sur, Culicán Sinaloa; Guillermo Prieto, (67) 165708-168141

NETHERLANDS

H.F.C.C. Hollandia, De Werf 60, The Hague, The Netherlands; G. de Jong, 031-070-3679820

NEW ZEALAND

Counties R/C Raceway, Pukekohe Showgrounds, Station Rd., Pukekohe, New Zealand; R. Northcott, 09 23 86904

Harewood Radio Control Car Club, 550 Sawyers Arms Rd., Christ Church, New Zealand; Dean Johnson, 09 03 3880 344

Papakura Indoor R/C Car Club, 25 Tainere Cres., Papakura, Auckland; Colin Perry, (09) 298-4711

Western District R/C Off-Road Car Club, CNV Bancroft/Akatea Drive, Auckland; Chris, (09) 838-5201

NORWAY

Dalen Raceway, P.B. 728, 6401 Molde, Norway; Johnny Reitan, 94 64 52 95

Hadeland Raceway, 2750 Gran, Gran Norway; Dag Bakke-Nielsen, 61330405

PHILIPPINES

Boyer R/C Hobby Shop, Unit No. 10 Lucas Commercial Center, Marcos Hiway, Mayamot, Antipolo, Rizal; Jose "Boy" Chua, 721-2555

Philippine R/C Association, B.F. Homes Paranaque, Metro Manila 1700; Ronald/Manny Villafior, 23-30-08

SOUTH AFRICA

Gordons Bay R/C Club (GBRC), Andrew Norman Sports Centre, Gordons Bay, Cape Province; Andre Hollander, 024-512865

SPAIN

ADAM, Mina Flores de la Sienna, Madrid, Spain Alvaro Sarabia, 01-7471113

Club Modelismo Catilla, P.O. Box 491, Burgos, Spain 09080; A.J. Pereda, 011-34-47-240130

Club Social Sevillana, Crta. Pulianas S/N, Granada, Spain; Oscar Saenz, 958-275282

Motoclub Castellon R.C., Rafalafena, S/N, 12004 Castellon, Spain; Octavio Traver, (34) 64 229705, (34) 64 237411

Outlaw-Ultima II, Puerto Rico 27, Madrid, Spain 28016; Juan Vacas, (34) 915197298

ROARCR, Naval Station, Rota, Spain (P.O. Box 53, FPO NY, NY 09540-0013); PO Kelly Sexton, 011-34-56-822652

CRAEM, La Elipa, Madrid, Spain; Pablo Llorente, 91-3865952

SWITZERLAND

E.M.B.C.M. Raceway, Main Street, opposite police station, 8854 Siebnen, Switzerland; Markus Schmid, 01-9233621

ERMC Raceway, 14 Ch de Taverney, 1218 Grand-Saconnex, Switzerland; M. Maurer, 19-41-22-798-9765

JMRCV-Terraindu Levant, Chemin ou Lemont, 1290 Versoix, Geneva, Switzerland; fax, 19 41 22 7790805

THAILAND

Bangkok R/C Spa Huamark, 164/1 Lardprao Soi 96, Wangthonglang Bangkok, Bangkok, Thailand 10310; Mr. S. Sanghavi, (662) 931-8390, fax (662) 587-1186

VENEZUELA

Las Fuentes R/C Club, 2da Calle las Fuentes El Paraíso, Caracas, DF 1020; Franco Agrusa, (02) 461-72 55

R/C Mariche, KM4 Zona Industrial, Del Este Via Mariche, Caracas, DF 1070-A; Bruno Morganti, 58-02-241-3969 or 241-4993

Robin R/C Racing Club, Avenida Bolivar CC Luz #1, Valencia, Edo., Carabobo; Fernando León, (041) 223997 or 222386

WEST INDIES

Island Raceway, 8 Mile Post Jacks Hill, St. Andrew, Jamaica, West Indies; Rodney Littau, (809) 926-7034 or 927-1198

ZIMBABWE

Mosi-Oa-Tunya, H9619 Highland Harare, Harare Country, Maslroland, Zimbabwe; 46237



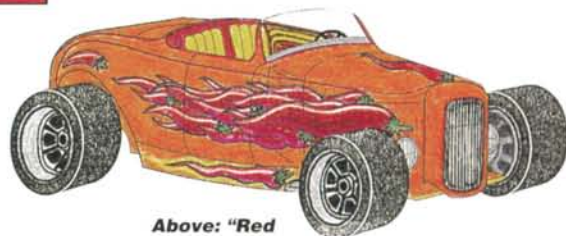
CHRIS'

BACK LOT

by Stacey Granelli

This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897.



Above: "Red Hot Chili Peppers" by Dorian Chanfreau of Paramount, CA, is our overall winner.

THIS IS MY page—mine! At least, it is *this* month. So get ready to hear all about some real hot R/C bods—hot-rod bods, that is—because we've chosen the winner of our "Project '29 Giveaway."

Back in December '94 when the entries started arriving, getting the mail became an adventure. At first, they came slowly. I passed them around the office and then put them into a folder that I kept on my desk. But soon I was engulfed in a deluge of entries that poured in and made my little folder overflow. They were taking over my desk—an ever-growing pile! So, to keep my head above water, I moved on to bigger and better storage methods: I taped them all to the walls. Months passed and we were soon surrounded by Project '29s.

They came in all sizes, shapes and styles. Most of you stuck with the basic template; some of you enlarged it; some of you drew your own. They were colored with crayon and magic marker; hand-painted; computer-generated; and air-brushed. They were detailed with hard-tops, modified grills and aluminum wheels made out of aluminum tape.

Some depicted an entire hot-rod experience—parking at a diner or cruising along the street. We saw everything from wizards, tigers, flames, stripes and puzzles to sharks, watermelons, flags and police cars. We saw some particularly unusual designs such as the Jurassic Park car, the car within a car, the Colombian map and the gravestone mobile, which shows the headstones of John Howell, Mike Ogle and Chris Chianelli. (An interesting statement, to say the least.

Did they offend someone somehow?)



Honorable mentions, clockwise from top: ■ The "Skeleton"—a computer-generated transparency—was designed by Doug Bray of Phoenix, NY. ■ Nan Hsiung from Arcadia, CA, sent in the "Shark Attack"—one of John Howell's favorites from the beginning. ■ "Stars and Stripes" is the work of Tim Wothing of Clio, MI. ■ The red and gold design was sent in by Nick Tinsler of Wausoan, OH. ■ From San Jose, CA, we have Marc Estrada's design, complete with hydraulic jack. Congratulations!

With so many fantastic entries, choosing a winner was very difficult. We needed to find a paint scheme that was creative and cool, but that also met our criterion that it should complement a true '29 hot rod. John Howell, John Huber and I recruited art director Betty Nero and special publications manager Karen Huber to help us decide. We all had special favorites, but the decision was unanimous: the "Red Hot Chili Pepper" mobile, sent in by Dorian Chanfreau of Paramount, CA, is our overall winner.

Drawing chili peppers to look like flames was an innovative approach to this traditional hot-rod motif. We especially like the lone pepper that curls over the rear wheel well. The colors are great, and the artwork is precise and well-done. Congratulations, Dorian! Keep your eyes open; your Project '29 will soon be arriving at your door. ■

